The Builder.

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Antiquities of Cyprus.

DOMINATED as it was, successively, by all the prominent and powerful nations of the old world, Greek, Assyrian, Egyptian, Phœnician, Roman, and Italian, the Island of Cyprus, it is easy to consider, would assume from time to time various phases of national and domestic life; and, by an equally easy induction, the traces of these successive waves of progress would not be difficult to discover, if only investigation were carried out scientifically and persistently enough. That the island was, indeed, full of valuable antiquities was no new fact to our nineteenth-century explorers. Florio Bustron, who wrote the "History of Cyprus" in the seventeenth century,—his manuscript is now preserved in the British Museum Library,—states that in the diggings at Constanza, a town which rose upon the ruins of Salamis, there were found during his time many medals in gold, silver, and copper, rings, earrings, necklaces, bracelets of gold and silver, and other ancient monuments in terra cotta and stone. Subsequent excavations verify all this, but it is remarkable that from Bustron's time until less than twenty years ago, no enterprising antiquary had taken the pains to conduct any investigation of sites that were afterwards to prove so fertile in the monuments and jewelry of the ancient races of the island. Now, however, there are few museums,—indeed, few private collections of antiquities of any pretension and magnitude,—which do not include specimens, some of considerable merit and value, that have been disinterred from the buried cities of the Cypriote littoral. But for the purpose we have in view on this occasion we shall limit our notice to the three great collections of antiquities which have been gathered together, and now attract the admiration of the world of archæologists and antiquaries. These are,—1. The British Museum Collection; 2. That of General L. P. di Cesnola; and 3. That of Major Palma di Cesnola, better known as the "Lawrence-Cesnola" Collection. The aggregate of these three large gatherings in all probability represents all that we are ever likely to recover from subterranean cemeteries and earth-covered sites of ruined cities and seaports along the island shore; for although some veteran archæologists believe that under judicious investigation sites even richer than those yet explored are to be uncovered, nevertheless the attempt to reclaim any great quantity of these relics has met with disappointment. Thus we may take it for granted that the known relics are fairly indicative of what will hereafter come to light.

1. The British Museum collection, although not large, is representative of the various periods and styles. It has been acquired chiefly by the labours of Mr. R. H. Lang, late H. M. Consul at Cyprus. Some of the objects were purchased for the Trustees from General L. P. di Cesnola; some were presented by the late Mr. Christie, the well-known archæologist; and others have been obtained individually by that process of gravitation or tendency to centralisation which all famous institutions possess as an inherent factor in their life and progress. At the present time no catalogue of these Cypriote relics, which are incorporated into our national collection, is extant. The relics themselves are scattered over the Museum, some on the ground-floor at the entrance to the Egyptian gallery and Assyrian corridors, in the charge of Dr. Birch, keeper of the Egyptian and Oriental antiquities; others, in the charge of Professor Newton, keeper of the Greek and Roman antiquities, in the upright wall cases in the old Egyptian rooms on the upper floor; and the smaller objects, such as glass, gold, silver, bronze, and so forth, are in other parts of the building. These antiquities consist of several large cases of stone figures, some full length and fairly perfect, while of others only the heads remain. These have been arranged by Dr. Birch in chronological periods of Archaic Greek, Later Greek, and Phœnico-Egyptian. Near these cases is a fine stone carving, representing the upper part of a draped statue of a deity, with a wreath on the brows, discovered by Consul Lang at Dali, the site of the ancient Idalium, which gives the well-known epithet to the goddess of love, who was especially venerated in, and, if we may believe the legends of the past, especially in her turn watched over and protected, the island. Another head, in the Egyptian style, and a male head of considerable merit, also in the Egyptian style, discovered by Mr. Lang, face the visitor as he walks up the gallery. In one of the cases on the right-hand side at the entrance of the gallery are deposited a number of terra-cotta figures, either toys or votive offerings, in the form of chariots, goddesses, and animals, which Cyprus has yielded so abundantly, and which may be compared with almost identically similar objects found by Dr. Schliemann in more than one of his remarkable excavations. Among the miscellaneous remains, not to mention the archaic pottery, a part of a silver spoon with an inscription upon it, and several slabs with Cypriote inscriptions, are worthy of notice. Above all, in importance, must be reckoned the stone with a bilingual inscription, Cypriote and Phœnician, by means of which Dr. Birch and the late Mr. George Smith discovered the Cypriote language to be of Greek form. A catalogue of the Cypriote antiquities in the British Museum, irrespective of the places of their preservation and deposit, would be especially welcome to antiquaries who have before them the works of the two brothers Di Cesnola.

2. The collections now arranged and exhibited in the New York Metropolitan Museum of Art, where they are under the directorship of their discoverer, were acquired by General Louis Palma di Cesnola, an Italian nobleman, a soldier of the Italian Revolution of 1848 and 1849, and of the American Civil War. In 1865 he was appointed American Consul to Cyprus. Hardly had he settled down to his official work at Larnaca, when he became impressed by the idea that Cyprus was the great central meeting point of the ancient races, and that the Greek settlements there in the heroic period must have derived from Phœnicia and Egypt the old Eastern civilisation. The General was not long in finding Larnaca,—the site of Citium or Kittium,—to be true to the signification of its name, the "place of the tombs." During the winter of the year 1865-66 he opened several hundred tombs in its vicinity, and conducted excavations at the Salines, the ancient fort of the city. These two sites, Larnaca and the Salines, proved rich beyond expectation in terra cottas, statuettes, and glass antiquities. In the following year, 1866, General di Cesnola visited the sites of Golgoi and Idalium, and there began his most remarkable disentombment of treasures from no less than fifteen thousand tombs; and in this work he continued, working at favourable opportunities, for ten years. These treasures consist, for the most part, of coins, glass, statues, inscribed stones, *bassi rilievi*, bronzes, gold and silver jewelry, engraved gems, statuettes, terra-cotta vases, and lamps. Here were found the earliest fictile works of Phœnician art, the finest collection of Greek glass then extant, and some of the oldest painted and decorated vases and fictilia which the modern world had then seen. It is an impressive fact, says the General, in the "Historical Notice" prefixed to his projected "Descriptive and Pictorial Atlas" of Cypriote Antiquities, that to the custom of securely burying with the dead favoured objects of the fine and industrial arts, whether inscribed or uninscribed, we owe much of what we know of the social and national life and history of ancient nations. The various tombs of Cyprus are sepulchres of the ages; Cyprus is in itself a series of cemeteries, forming one vast necropolis that unfolds to us the history of ancient civilisation. The Greek graves and tombs, which he explored on the hill-slope of Idalium, were struck at a depth of 3 ft. below the surface; 2 ft. 6 in. below these were the Phœnician tombs. These latter were constructed in a remarkable manner. Commencing at the foot of the hill, a square excavation was made into the bank from the east, then a further excavation of an oval

shaped chamber, which was prepared by plastering it with earth. These tombs were intended for the sepulchre of one or three persons; if for one, a platform was constructed on the western side, raised a few inches above the ground of the tomb, and upon it the body was laid facing to the east. When three occupants were to share the tomb this raised platform extended on each of the three sides away from the entrance, and the bodies lying on the north and south sides were placed with their heads to the east. In almost every instance the tombs rewarded the searchers with some works of art and utility. Those tombs that had received their complement of the dead were closed with a large stone slab; the sepulchral inscriptions upon them being in many cases preserved by the explorer. Sometimes a bas-relief adorned with iconic figures closed the entrance, and judging from the specimens which are preserved, these form a most remarkable feature of the collection. The tombs on being opened indicated that the rain of ages had penetrated through to them, conveying disintegrated soil, which in most cases completely filled them. Hence the prosecution of these researches, so extensively planned, with unskilful native assistance only, and with tools and appliances inadequate to the task, taxed the patience and ingenuity of Di Cesnola. At first, we are told, there was necessarily some breakage, but soon the workmen were restricted to the use of their hands, a knife, and a basket, and thus with care everything was saved intact. A common pick or hoe, a rude wooden shovel, and a few levers of wood and iron were the only implements used during the excavations. It is curious to note that the General accounts for the superposition of the Greek cemetery upon the Phœnician tombs by the fact that Phœnician Idalium was destroyed in the ninth century B.C., and the *débris* of the structures near the top of the necropolis, and even a portion of the hill itself, were carried by the wear of centuries of atmospheric action down the slope, so completely covering the tombs that in after times the Greeks were unaware that their necropolis reposed upon another and an older city of the dead.

In the winter of 1869-70 the indefatigable General again turned his attention to Cyprus. This time he was attracted to Golgoi, of which town the temple had been the object of much fruitless research. In spite of difficulties, chiefly caused by the unreliability of historical data, tradition, original names, and of surface ruins, the site was defined, and in March, 1870, the excavator was again rewarded by the discovery of the site of the historic temple. This edifice had hitherto been sought upon an acropolis, as a Greek structure, but in reality it was found to stand among the extinct groves and limpid fountains of the valley, clustered round about with tombs, the foundations being no less than 6 ft. 6 in. below the surface. This was a fruitful year to the explorer; for during 1870 he visited and surveyed the sites of Paphos, Soli, Ormidia, Aphrodisium, Karpas, Salamis, Poli, and Amathus. Three years afterwards, after a visit to America, Cyprus was again visited; and, in 1873, the exploration of the site of Curium resulted in the magnificent discovery of a collection of gold, silver, and engraved gems of such extraordinary richness that the antiquities from this place alone may be truly called a museum in itself. In 1877, General di Cesnola, then in London, having unsuccessfully endeavoured to dispose of his treasures to the British Museum, for reasons which it is now fruitless to detail, brought out his work, entitled "Cyprus: its Ancient Cities, Tombs, and Temples." This work passed through three editions, the third being issued in the following year by Harper & Brothers, of New York, to which city the collection was removed, and the scientific display of these relics now adorns the Metropolitan Museum of Art there. Although all Englishmen are ready to deplore the fact that no patriotic antiquary stepped forward at the right moment to secure the location of this marvellous collection in England when the course of events proved adverse to the acquisition of them for the British Museum, yet no one will, we feel sure, grudge the Americans the possession of such an unrivalled collection of Cypriote art-treasures.

We do not propose to criticise the work mentioned above: written in a clear and lucid style, adorned with a vast number of woodcuts executed by masterly hands, such as those who are familiar with the best American style of illustration will readily call to mind, a careful perusal of this work, which is really a masterly production in a literary as well as an archæological sense, leaves the reader fairly astonished with the multiplicity of relics, the variety of styles of art, the immense range of centuries, and waves of feeling which must have come and gone over the

"Insula læta choris, blandorum et mater amorum."

General di Cesnola's collection consists of the spoils of Citium, which are terra-cotta vases in a multiplicity of elegant forms, figurines or statuettes in different stages of fineness, many being iconic, and some grotesque, sarcophagi, sepulchral cippi with inscriptions, alabaster vases, and terra-cotta masks, which may be compared with the Etruscan masks which we mentioned in our recent notice of the new Etruscan-room in the British Museum; and the relics of Dali or Idalium, formerly excavated by the Comte de Vogüé in 1862, and by Consul Lang at a later date. These comprise double-handled vases of great capacity, vases with Phœnician inscriptions burnt in on the clay, gold amulets, earrings, finger-rings, and carcanets, pottery of the whole circle of Greek conventional contours, glass vessels of the style called Phœnician, tumbler-shaped with gouttes, striated, banded, and marbled in the style which closely resembles the marbling on the edges of a modern book; terra-cotta lamps of the Roman period, and bronze bowls or saucers engraved with representations of sacred ceremonies or the divine cult of the deities who found favour with the inhabitants. From Alambra, by the same explorer, many copper spear-heads and weapons were procured; from Dali a large number of vases in forms of animals, zoomorphic reproductions in clay adapted to domestic and religious uses as libation bowls, tetines, and unguentaria; the varieties of these cannot here be put on record. Golgoi yielded, among numerous other things, a sarcophagus sculptured with a boar hunt and a symposial scene, a silver patera in the Egyptian style adorned with engravings of the papyrus flower, and the sacred boat so commonly found in Egyptian works of antique art; Assyrian statues of considerable dimensions worked in the creamy-white calcareous stone, which appears, with few exceptions, to have formed the vehicle of the ancient Cypriote statuary and mason; colossal heads; figures of Venus, Cybele, Hercules, and other divinities; and a rich and varied gathering of archæological relics. From Amathus the General recovered a very fine stone sarcophagus, sculptured with chariot scenes and Greek foliage; alabaster vases; and bossed shields, with combats between lions and bulls, with a guilloche bordering. But perhaps the ancient site of Curium yielded into his hands the most abundant hypogean harvest of all, for it would be, indeed, difficult to say what branch of archæology is not represented by the *trouvaille*. Mosaic pavements of elegant contrast and charming proportion of design; the golden armlets of Eteander, king of Paphos, whose name occurs under the form of Ithuander in the list of Cypriote kings who brought tribute to the Assyrian monarch Esarhaddon, B.C. 672; agate sceptres; gold rings formed like the twisted screw of a cork-screw; armillæ; bracelets; gold rings carved with the heads of griffins and chimæræ; scarabæi of Egyptian and Phœnician workmanship; goldsmith's work of that fine filagree and granular style with which visitors to the gold-room of the British Museum are not unfamiliar, although these latter come from Etrurian and Latin sites; silver jugs and vessels; gold and silver paterae; necklaces, with pendants in form of the head of Medusa, the sphinx, the lotus, or the pomegranate; a rock-crystal vase fitted with a golden stopper; models of chariots with two and four horses; bronze tripods and candelabra, jugs, feet and handles and ornaments of bowls and sacrificial vessels, and a few marbles. The General's book has its value enhanced by a treatise on the rings and gems of the treasure of Curium, by Mr. C. W. King, whose works on gems have been so well appreciated by English lovers of what is beautiful in ancient glyptic art; and by a monograph on the pottery of Cyprus, by Mr. A. S. Murray, of the British Museum; as well as by an appendix of 105 Greek inscriptions, sixty-two in the Cypriote language, forming a valuable addition to the somewhat meagre *corpus* of this remarkable language; and thirty Phœnician inscriptions, chiefly from the excavations on the site of a ruined temple at Citium.

To sum up, the General claims to have explored and identified the ancient and royal cities of Amathus, Cerynia, Citium, Golgos or Golgoi, Lapethus, Salamis, and Paphos; to have discovered the ruins of Ammochostos or Famagosta, Aphrodisium, Carpassia, Curium, Cythera, Marium, Soli, and Tamassus, royal cities of Strabo and Cl. Ptolemy; and to have examined the sites of Arsinoe, Audimo, Catalina, Curi, Larnaca, Pergamos, Throni, Tremitus, and several other ancient towns of the geographers. Fifteen ancient temples dedicated to Artemis, Baal, Venus, Cybele, Apollo, or Hercules; sixty necropolises, with a grand total of 60,932 tombs; and six ancient aqueducts, are a pretty fair share of archæological practice to fall to any man; and these yielded, among other things, 2,310 coins, and upwards of 14,000 vases, 2,110 statues, 4,200 busts, 138 cippi, 270 *bassi rilievi*, 4 sculptured sarcophagi, 1,090 engraved gems and scarabs, 3,719 glass vases and bottles, 1,599 gold bracelets and other objects, 370 silver, 2,107 copper and bronze antiquities, and 2,300 terra-cotta lamps, the total amounting to upwards of 35,000 antiquities. It is but just to the General to record the fact that it was owing to his determination not only to keep the collections in one body under his own name, but also, if possible, to secure them for his adopted country—the United States,—that the trustees of the New York Museum were successful in their efforts to secure them. Had the General been less resolute on these points, or more mercenary, the collections would have been disintegrated, and the articles sold separately, to his pecuniary benefit, but to the incalculable loss of science.

3. But if the collection of General di Cesnola is no longer an available wherewithal for English students to study the phases of Cypriote art, happily there is yet another collection almost equal to it in numerical amount, and quite as valuable in regard to the variety of forms and substances, and in respect to the period of time which it covers and illustrates. This is the "Lawrence-Cesnola" Collection, consisting of objects of antiquity derived from ancient sites in the island of Cyprus which were excavated by Major Alexander Palma di Cesnola during the years 1876—1879, the funds necessary for the work being in the main contributed by Mr. Edwin Lawrence, F.S.A. This collection is entirely distinct from that in the New York Museum already described, which it so nearly resembles; Major A. P. di Cesnola, brother of the General, and his companion in many labours in Cyprus, remained in the island after the departure of that illustrious explorer, and succeeded in unearthing a prodigious number of relics of various materials and nationalities, the outcome of different ages, the exponents of widely dissimilar artistic modes. These antiquities are now in London, at Holland Park, and, although not for sale, our readers who are interested in them will be glad to know that they may be seen by archæologists on application to the Major at Palma Villa, Woodchurch-road, West Hampstead. Two publications are destined to manifest the contents of this series: the first, entitled "Cyprus Antiquities excavated by Major A. P. di Cesnola, 1876 to 1879," is an album of large oblong folio size, containing, with accompanying letterpress, sixty plates of silver process photographs, in which are comprised illustrations of several thousand objects, statues in terra cotta, bronze, and stone, glass and terra-cotta vessels, bronze and iron implements and arms, ornaments in gold and silver, gems and precious stones, and a series of the many ancient currencies. Most of these, also, come from the tombs; but numerous sculptured statuettes and *bassi rilievi* were found among the ruins of the temples, or in walled enclosures into which they were cast, after being broken, in obedience to an edict promulgated by Constantine the Great, by converts to Christianity. In these square enclosures the broken statues lay in heaps; at Kurium, for example, not far from the Temple of Apollo, a heap was found where the heads were in the lowest layer, the bodies in the middle, and the feet over all, at about a yard beneath the surface. Again, in some ruins believed by Major di Cesnola to be the city of Throni, an inclosure 40 ft. square was discovered, containing, as he narrates, parts of more than a thousand statuettes in terra cotta, representing priestesses bearing offerings, beautifully decorated, and with crowned or turreted heads. With incredible labour, about 200 figures were entirely reconstructed, ranging in height from 3 ft. It would be impossible to give a mere list of the varieties of objects, but among the most curious figured in the "Album" are thin plates of gold foil pricked and embossed

in elegant patterns, and employed to cover the features of the dead, some of these being intended for the mouth, others for the eyes, chaplets for the forehead, and so forth; earrings of filigree and gold wire set with pearls, rubies, pastes, mosaics, and precious stones; necklaces with phallic emblems of a most pronounced character, and undoubtedly worn openly by the richer class of females; gem rings, silver and leaden toys and ornaments, bronze strigils, mirrors, iron weapons, bone and ivory boxes and pins for the hair, inscribed cylinders of hæmatite, jasper and steatite, scarabæi, cones for seals, Phœnician and iridescent glass vessels, some moulded, with inscriptions, others painted exquisitely by hand; unguentaria, bowls, pateræ, large sepulchral or cinerary urns of great size, adorned with geometrical patterns and simple archaic forms of animals, men, and trees; amphoræ, alabastra, sepulchral and votive inscriptions in the Greek, Cypriote, and Phœnician languages; an infinity of clay fictilia, ranging from the earliest Phœnician period down to the establishment of decided Greek fashions; cylindrical vessels with holes pierced in the side and a loop handle on the top, serving to hold lighted charcoal for warming the hands; terra-cotta horsemen, chariots and charioteers, tetines, rudely-shaped figures or toys of Venus, gods and goddesses, pigs, geese, cocks, horses, and other animals; pearl shells with inscriptions upon them, thin rolls of lead with inscriptions in the languages already mentioned; masks, busts, lamps, and stone heads and statues. This pictorial work, just published, will be supplemented at Easter by "Salaminia: its History, Treasures, and Antiquities," by the same author, in which is given a systematic description of upwards of 14,000 relics of the kind already referred to, from Kition, Larnaka, Timpou, Throni, Kurium, Dali, Soli, Golgos, and, above all, from Salamina, the ancient Salamis of Teucer, which has yielded a large proportion of the treasures in this collection. In the preparation of the text of his work describing "things of Salamis," or *Salaminia*, several archæologists of reputation have assisted the author, among them Dr. Birch, Professor Sayce, and M. Pierides, of Cyprus, whose own collection of antiquities is considerable and important. Copiously illustrated as it is with selections from every class of the remains, and amounting to nearly 800 figures or woodcuts, recording new and hitherto unpublished inscriptions in the four languages which successively flourished in the island; and submitting new types to the inspection and consideration of the comparative antiquary, the work of Major di Cesnola will hardly fail to be found of special interest, particularly at the present time, when the public mind is so keenly alive to the importance of Cypriote antiquities.

THE ELECTRIC EXHIBITION AT THE CRYSTAL PALACE.

IT is curious to observe the special physiognomy of the Electric Exhibition, as contrasted with that of the Smoke Abating Appliances at South Kensington. At Sydenham, indeed, a double attraction is offered. While science may be pursued by day-light, it is when the shadows of evening close in that the visible attraction of the brilliant lights has most charm for those who care more for amusement than for instruction. Nothing, as a general rule, is more attractive to an urban public than brilliant illumination. And when novelty and curiosity are added to the attraction of splendour, there is little room left for surprise at the fact (as stated by the officers of the establishment) that the numbers of visitors now drawn to the Palace are almost without precedent.

The number of young people who frequent the morning exhibition at Sydenham is remarkable. And they come, for the most part, evidently as learners,—asking for explanations of the various novel forms of apparatus which are of such recent birth. In fact, a careful study of the Exhibition leads to the conviction that it is the cradle of a new and mighty power which we are thus allowed to inspect. At South Kensington, on the contrary, it is, we fear, rather a losing battle with the inconveniences of urban life that suggests itself as the net result. Let us hope that this may not be altogether the case as to smoke. As to electricity, there can be no hesitation in predicting an immeasurable future.

Regarded in this light, the most instructive feature of the whole exhibition is the collection of historical telegraphic apparatus which is to be found in the north nave, and which is described on pages 13 to 23 of the official catalogue. Of these exhibits, the earliest goes back to a date beyond the memory, not only of ourselves, but of most of the visitors. It is the original model of a dial telegraph, invented by Sir Francis Ronalds, and laid down in the inventor's garden at Hammersmith, in 1816. Two dials, connected by a wire, were made to rotate synchronously by clock-work. When the letter which it was desired to signal appeared at the opening, a charge of statical electricity from a Leyden jar was sent into the wire, and the divergence of two pith balls at both the sending and receiving ends indicated the letter. In this elegant invention, now sixty-six years old, lies the principle of what, in our opinion, is the most promising form of both the visible and the recording telegraph. The one stride,—and it is indeed a seven-leagued one,—that has been made since 1816, is the application of the electric energy itself to produce both the rotation and the synchronic movement of the discs. The first work on the electric telegraph in the English language was published in 1823, by Sir F. Ronalds, and a copy of it is to be found in the Exhibition.

In the second exhibit of this historical series we come to facts to which we have on former occasions referred as coming within the range of personal recollection. They are those of the first practical underground telegraph, which was laid between Euston-square and Camden-town stations in 1837, by Messrs. Cooke & Wheatstone. This telegraph sprang directly from the needs of the railway system. On the opening of the railway the trains were drawn from Euston to Camden-town over inclines which, in one part, were as steep as 1 in 66, by a rope, wound by a stationary engine, as the gradients rendered necessary by the levels of the Hampstead-road and Park-street were then thought too steep to be surmounted by the locomotive. It, therefore, became necessary to contrive a means of giving a certain signal from the platform at Euston to the engine-house at Camden-town, and a series of experiments, directed by Mr. Robert Stephenson, resulted in the employment of electricity for the purpose. The exhibit in question is a triangular bit of wood, in grooves in which five wires coated with cotton and pitch were laid, and wedged in. These five wires were connected with the same number of magnetic needles, in conjunction with five Schweigger's multipliers. Each needle was capable of deflection either to the right or to the left, until it struck on an ivory stop. The directions of the needles formed a diagram, with letters at the intersection of the lines, and this first reading-board was known as the five-needle or hatchment telegraph. In 1838, by the omission of the letters C, Q, J, U, and Z, the number of needles and connecting wires was reduced to four. In 1842 it was found possible to give adequate signals by two needles only, and an instrument on that principle, which was fixed at Slough in that year, is shown at Sydenham. The instrument made in 1852 for the then new Houses of Parliament is also shown. In 1852 an improved form of double-needle telegraph was introduced; and in 1869 the modern form of the single-needle instrument was adopted. The use of the German Union Morse alphabet was adopted in 1855. This code, while the same in principle as the dot and dash system, is formed of inclined lines, long and short, and incline either to right or to left. The symbols for the letters have a much more alphabetic look than the plain dots and dashes, and might almost be mistaken, at the first glance, for Sanscrit or some cognate Indian letters, especially Tamil and Mantchoo.

We pass over about a dozen further steps, due to different inventors, and come to the form which has always seemed to us the most valuable, inasmuch as it dispenses with any special study for the reading of the signals. This is the A B C instrument, in which the letters of the alphabet are either visibly arranged in a circle, or in which a wheel revolves behind the dial-plate, presenting one letter at a time through an aperture. This was accomplished in 1840 by Cooke and Wheatstone, on Sir F. Ronalds's plan, the revolution being given by a train of clockwork, actuated by a main spring. Another form of the same instrument has a pointer instead of a revolving card. In 1858 the modern form of this instrument was arrived at, the motor power being magneto-electric.

This highly-interesting part of the exhibition contains further a collection of keys, a collection of relays, and other important appliances, including railway-signalling apparatus, insulators, batteries, and submarine cables. Here also is to be found a series of exhibits connected with a subject of great value to the architect, viz.,—a selection of lightning protectors used at different periods. These, of course, apply to the protection of the telegraphic apparatus; but the subject will be found, in another part of the exhibition, illustrated as regards the protection of spires, roofs, and buildings in general from the electric fluid. This is an instance of the manner in which the new science comes home to us, often in the most unexpected way.

Close to the historic series, and preceding it in the catalogue, is an exhibition of the modern telegraphic apparatus now used by the British Post Office.

Next to the use of electric agency for purposes of signal, came, in order of time, the application of the same multiform energy for the purposes of the miner. It is thus appropriate to find the display of the "special stores used in submarine mining," which is made by the War Office, close to the historic collection above described. In this War Office collection, it may be observed, nothing is to be found which relates to the fish torpedo, or to any form of that formidable weapon of defence, except that which is now described as a submarine mine; that is to say, a case containing a charge of gun-cotton or other explosive, which is to be moored at a certain fixed point, and fired either by wire from the shore or by contact with a hostile vessel. Patterns are shown of these formidable weapons up to those containing 500 lb. of gun-cotton, or even more. There is also a telescopic apparatus, intended to give warning when the vessel is over a mine which it is intended to fire from the shore, called in the language of the catalogue, "arc firing." The instruments used on shore in connexion with this important branch of our naval defence are also exhibited. These are succeeded by samples of the field telegraph and mountain telegraph equipment now used by the Royal Engineers; by the field equipment of the same corps for hasty demolition; and by miscellaneous apparatus for the military service, including the Heliostat and the lime-light lantern for army signalling.

The general Exhibition (exclusive of the exhibits before mentioned) is divided into twelve classes, with a thirteenth class under the comprehensive title, "Miscellaneous." This arrangement is cross-divided into the two heads of English and Foreign exhibitors. Of the former there is also a fourteenth class, comprising generators, and steam, gas, and hydraulic engines, applicable to electric industries, which is not represented in the foreign part of the catalogue. Class I. contains apparatus connected with static electricity, in which the educational apparatus, as used by Professor Tyndall and other lecturers, possesses great interest, as showing how little comparatively was known on the subject when men who are not yet very old were at school. Class II. contains "batteries and allied apparatus," among which should be carefully noted the collection shown in the Southern Gallery by Mr. Blackwell, of 26, Chapel-street, Liverpool. The porous plates, cells, cylinders, and crucibles of Messrs. Stiff, as well as those of Messrs. Doulton, are to be found in this class; in which, under the foreign department, are also the secondary electric batteries of Léon Somzée, of Brussels, which the inventor claims to be more powerful than either the Faure or the Planté batteries. The Faure accumulator is to be found in the west corridor, and the air batteries of Messrs. J. H. Gladstone and A. Tribe in the south nave.

Class III. contains magneto-electric and dynamo-electric machines. Of these there are twenty-four by English, and six by foreign exhibitors. Among them we were struck by the compact solidity of Mr. Crompton's Bürgin machines of the improved form, which received a gold medal at the Paris Exhibition. They supply the current for six arc lamps of 3,000 candles, and for one large central lamp of 6 000 candles. The Anglo-American Brush Light Corporation show a dynamo-electric machine for working forty lamps of 2,000 candles each on one circuit, and a machine for a single light of 150,000 candles. The numerous inventions of the Messrs. Siemens are in the west corridor. The exhibits under this class deserve very careful attention.

Class IV. comprises "cables, wires, conductors, and allied apparatus." There are

forty-three English and two foreign exhibitors. The exhibits of the "Telegraph Construction and Maintenance Company," in the south nave, and those of Messrs. Siemens, are here to be regarded, as well as specimens of the first submarine wire ever laid (by the Submarine Telegraph Company), a piece of which was picked up in the Channel by a fisherman's trawl twenty-five years after it was laid down.

Class V. consists of apparatus for measuring electricity,—a subject of too much technical detail to be discussed here. There are seventeen English and two foreign exhibitors.

Class VI. contains "telegraphic signals and allied apparatus." In this, as indeed in other classes, we find the same appliances in the hands of different exhibitors; the name of the inventor being replaced by that of the manufacturer or the seller. It is thus out of our power to do full justice to the admirable mechanic, or mechanics, who have done so much to perfect the printing instruments, and fire and other alarms, exhibited by the "Exchange Telegraph Company," and claimed as being patented by that company. It will be evident to any one familiar with our patent laws that the extent to which they can protect almost any invention in this exhibition, as to principle, must be very doubtful; and that it is by excellence of manufacture, joined to economy of price, that priority will in the long run be secured by any competitor. Thus the street fire-alarm system, which is an admirable invention, is exhibited and claimed as patent right by this company, and also by Mr. Bright, C.E. No. 122 on p. 49 of the catalogue. Posts are erected at fixed points, each of which contains an electric bell-knob, protected by a piece of ordinary glass. On an alarm of fire, the policeman or other person who wishes to communicate it breaks the glass, and presses the knob within. An alarm bell at once rings at the central station. A number corresponding to that of the post is at the same time there indicated, and on being duly noted the words "signal received" come into sight at the alarm-post. A more sensible and rapid mode of indicating the locality of a fire it would hardly be possible to imagine. Domestic alarms are made by the same manufacturers, so contrived that, when a house is shut up for the night, the opening of any door or window will at once set up a loud electric alarm, which will continue till the proper means be taken to restore quiet. It is easy to connect this apparatus not only with a house alarm, but with one at a police station, and the house disturbed may thus be indicated in the same way as that used for the fire-alarm posts. The universal adoption of this admirable system of automatic warning would go very far to render burglary impossible in a town, or even in a properly-watched country-house. The connexions with the doors and windows may be so arranged as to be beyond the power of servants to tamper with them, the throwing the whole into, or out of, gear being readily controllable by the master of the place.

Class VII. contains telephones, microphones, and photophones, instruments of which the very names are but a few years old. There are twenty-six English and nine foreign exhibitors. Under this head will be found, in the Entertainment Court, numerous specimens of apparatus invented by Mr. T. A. Edison. The Western Electric Company of New York, Chicago, Boston, and Indianopolis, U.S., is an important exhibitor of these instruments. The articles manufactured by Mr. J. S. Lewis, of Birkenhead, are very carefully finished. This class is one as to which the verdict of a competent professional reporter would be of value to the public.

As to Class VIII., electric lighting, on the other hand, every visitor will be enabled, and probably disposed, to form his own opinion. There are thirty-eight English and thirteen foreign exhibitors. Patents, names, so-called "systems," and varieties of detail are as numerous as are the several exhibitors, and, indeed, more so, as hardly one of them confines his efforts to a single piece of apparatus. But from the stand-point of practical inquiry, the modes of electric lighting are only two. There are the various ingenious modes of producing the arc light, which is, in fact, no other than a continuous electric spark between two points of carbon, usually open to the air, and there are the less varied forms of incandescent light. This we have before now described as a small glass globe or vessel like a minute soda-water bottle, in which is enclosed, *in vacuo*, a filament of carbon, made either of card, cotton, grass, or other vegetable material, which can be connected by means of wires with the electric circuit. In the arc system it is the resistance of the air, or of the slight break in the continuity of the circuit, which holds back the current until its intensity becomes visible in taking the leap. In the incandescent system it is the resistance produced by forcing the current through a very small and very refractory conductor which has the same result. The simplicity of the latter is so much greater that it would hardly be rash to predict that for any purposes of ordinary domestic lighting the incandescent plan will hereafter bear the bell. For large and powerful signals or centres of light, as for lighthouses, railway or shipping stations, or public works conducted by night, on the other hand, the arc light will be probably more suitable. As to this, the various "regulators" are only so many methods, some of them of great ingenuity and beauty, of keeping the points of the pencils of carbon accurately equi-distant, notwithstanding the steady consumption of the carbon of one pole. Among those plans one which struck us as most admirable in its workmanship was a regulator made by Mr. A. E. Crompton, of the Arc Works, Chelmsford. The incandescent lamps require none of this complicated machinery, the connexion with the circuit being made simply by slipping the little bottle into its receptacle, the lighting then depending solely on the motion of the generator. Whether it be the Edison, the Lane Fox, or any other form, is a matter which it requires a special knowledge of the case to determine. To the general public the sole question will be that of price. The price of one of these little lamps has been reduced from 12*s.* 6*d.* to 5*s.*, if not lower, already. We should venture to guess that the cost to the manufacturer cannot exceed a shilling. Each is reckoned to last,—that is to say, to remain with the carbon in order,—for 1,000 hours of lighting. We think there is little doubt that as much of this price as now represents patent right will gradually disappear, and that the cost of the incandescent light will be reduced to a sum that will cover the actual cost of the power required, the outlay on plant, and the fair manufacturer's profit on the same. At the same time, we must recall the fact that the effect on the eyes of the intense brilliancy of the electric light forms an obstacle of a very serious character to its permanent adoption as a source of domestic lighting. At all events, the subject is now fairly brought before the ultimate jury —the public.

Class IX. is extremely disappointing. It illustrates "Electric Motors and Transmission of Energy." In this, which is the part of the whole field on which the man of science is most anxious for full information, there are only seven English and eight foreign exhibitors. The exhibits chiefly refer to what are called small motor powers, as, for example, a small motor (which could be put easily into the pocket) for a sewing-machine. The all-important problem of transmission of energy is hardly in any way illustrated here. We should have thought that store batteries, or accumulators, with their respective modes of charging and of distribution, ought to have been fully illustrated under this class.

Class X. consists of electro-medical apparatus, as to which we have only to remark that while we can bear personal testimony to the admirable effect of the interrupted secondary current in the relief of acute lumbago, the subject is one which perhaps, more than almost any other, lends its hand to quackery. At all events, the sixteen British and two foreign exhibitors present a wonderful variety of "infallible cures."

Class XI., electro-chemistry, is one in which the exhibits may be regarded as almost wholly scientific. Many of them are of great elegance and beauty. There are eight British, and five foreign, exhibitors. The electro-coppered press rams and plungers, as well as rollers, exhibited by the Broughton Copper Works Company, of Manchester, are wonderful triumphs of electro-metallurgy. The electro deposits of Messrs. Elkington, the applications of local electric action to chemical work by Dr. Gladstone and Mr. Tribe, and the various forms in which nickel is exhibited by Messrs. Wiggin & Co., of Birmingham, are among the most interesting items in a class which may perhaps be called almost the most instructive part of the whole exhibition.

In Class XII. we enter on a wholly different field, comprising magnets, compasses, horology, instruments of precision, &c. Of this, as also of the two following classes, we have not now room to speak, although the practical value of many of these exhibits is not inferior to that of any other class in the building. We hope that we have been able to give our readers some idea of the enormous field now open to the labours of the electrician. And yet, numerous as are the exhibits, and comprehensive as are many of the classes, there are great departments of the vast subject wholly unrepresented at Sydenham. Such, to go no further, is the meteoro-electric apparatus for automatic observation, record, and advice, which has been brought to such high perfection in Belgium. Such is the application of electricity to horticulture, and even to agriculture. Such, above all, is its application to locomotion. The man who is at home with the latest outcome of the science and the art of the electrician, in all its unbounded range, may well be described as having "taken all human knowledge as his portion." Those must be dull at learning, and incapable of being amused, who fail to draw delight from a visit to the Electric Exhibition at the Crystal Palace.

THE THAMES EMBANKMENT.

LONDONERS have recently had their attention rather rudely attracted to the Thames Embankment, and not a small section of the community has learned with dismay that a thoroughfare brilliantly illuminated with the electric light has as much cause to be dreaded after certain hours at night as was ever Hounslow-heath or Crackskull-common in the days of Tony Lumpkin. The theories of the moral influence that the electric light was to exercise on society,—driving crime before it like the criminal who flies before the Nemesis of Justice in Prud'hon's famous picture,—would seem to have received a singular shock when murder is committed under the all-searching eye of the Brush system. But the fault lies not with the electric light. We are not prepared to enter into the social bearings of the question, with its sad proof of the moral depravity of certain sections of the dependent classes in our great city, the existence of which we ascertained when probing the back slums of London at a time when the fact was scarcely believed in. To blame the police is not within our province, but must it not appear to every one familiar with the Embankment that perhaps the chief cause of the terrible stories that have lately been brought before the attention of the Home Secretary consists in the loneliness and desertion that reign after dark along the broad thoroughfare which stretches its length from Blackfriars Bridge to the Houses of Parliament? We do not speak of the even more lonely and scarcely less suspicious Albert Embankment on the other side of the water, and again, on the northern side, the Chelsea Embankment.

By a strange fatality, these great undertakings, which rank among the best works of modern days, such as moralists have at all times considered as no mean agencies in the general spread of civilisation and refinement, have found their earlier history associated with tales of ruffianism that recall the dark ages, or the times when London streets were dimly lighted with the flickering oil-lamps which some still among us remember to have seen in their youth lingering on with characteristic traditionalism in Grosvenor-square. The reasons are simple that can be assigned for the perpetration of crime under the very shadow of the Temple and the Clock Tower, on which burns at night the great mast-head light that tells us when our legislators are at work. The Embankment is, as we have remarked, after a certain hour a deserted thoroughfare, except to a few stray foot-passengers, a few rattling hansom-cabs, and a few heavy wagons and drays; otherwise the broad stretch of roadway, with its pretty line of trees and seats, the electric light, the superb view of the river,—on a calm night, with the long reflections in the water, one of the grandest sights in the world,—is practically deserted, or, as we have recently had occasion to see, frequented by dangerous criminals. It is evident that the mere increase of the police-force is but a half measure, scarcely calculated to recommend the thoroughfare to peaceable citizens. What is wanted is some measure of a slightly more humanising character.

To those familiar with the cities of the world it must constantly be apparent how magnificent an opportunity is wasted in the mode in which

the Embankment is laid out. The long, gaunt spaces in the hands of the Duchy of Lancaster or the Vacant Lands Commission, the blackened scaffolding of that monster fiasco the National Opera House, the stretch of railed-in garden, so charming in the daytime, seem to breathe at night an air of mystery and general desertion. What should be done to give the Embankment some of the life which will rid it of the shadow of death which the police reports prove to us has passed over the spot more often even than can be discovered? When the Embankment was opened, and still more recently when Northumberland-avenue was cut through from Trafalgar-square, it was justly expected that not a small portion of the congested traffic of the Strand would be relieved; but human nature, with all its respectability, is, after all, but human, and it was not unnatural that the gaiety of the shops should attract more than the silence of the electrically lighted Embankment —the brilliant light only serving to enhance the darkness.

What is wanted along the Embankment is a line of shops, of *cafés*, of kiosks, such as give to the modern thoroughfares of the French capital their lively character. Properly planned, it would be scarcely possible to imagine a spot with greater capabilities than the Thames Embankment, with its broad pavements and broad roadway, the terrace formed by the river quay, the river itself, the monuments that line the thoroughfare, the Temple, Somerset House, Waterloo Bridge, the Savoy, Adelphi-terrace, the Obelisk, York-gate, the Charing-cross station, and Whitehall, ending with the picturesque and grandiose pile of the Houses of Parliament. Could the tide of traffic only be turned along the thoroughfare, there would be no need of doubling the police-force. The suggestion has, we believe, been made that the Embankment gardens might be more profitably used for building purposes; but here we demur. Chatham, who first called our parks "the lungs of London," would have rejoiced to see reclaimed from the filth of the river-bank the long line of green which stretches so pleasantly at present alongside the silver Thames. There are means of utilising in part the gardens without necessarily abolishing them. Why should not a line of shops be erected? The gardens would still remain, only a few feet of their area cut off by a space that would bring in a handsome yearly rental. Something unquestionably will have to be done before long, to render the Embankment less lugubrious. The two theatres which have now been added to its adornment will, it is to be hoped, commence the movement. Why should not the old "Folly" of William III.'s reign be revived? —the "musical summer-house" which, built on a barge and moored in the river off the Savoy, was frequented, 200 years ago, by all the fashionable folk, from the king and queen downwards. Here is an opening for a novel place of amusement. Every one who knows Paris remembers the "Bains de la Frégate" in the picturesque man-o'-war moored in the Seine near the Pont Royal. Why should not some of our old three-deckers serve also as bath-houses, and keep company with the Naval Artillery Volunteers' floating battery off Somerset House? There are a hundred means by which the Thames Embankment might be rendered attractive; and when we hear of the crimes that are committed, protected by the deserted nature of the thoroughfare, it is time, we imagine, that steps should be taken to remedy the evil. Tram traffic, much as we hate it, might be established between Blackfriars and Westminster Bridges. The ingenuity of our Local Authorities could easily be employed in worse directions than in the consideration of a question which has now forced itself upon public attention in a somewhat alarming fashion. If we are to wait while building plots are filled up, it will be long before the Embankment is fully occupied, and even then the gloomy nature of the thoroughfare would be little enlivened. Concessions should be made by the authorities to induce initiative, just as Napoleon I. exempted from tax during thirty years all the householders who built up the Rue de Rivoli, or in the spirit of the large money rewards which the municipality of Brussels have awarded from time to time to the builders of the most successful façades erected in their grand new Boulevard Centrale. One feature unquestionably might be introduced, the French kiosk for the sale of newspapers or flowers. No one who, from experience, is able to compare the wretched condition of our ragged newspaper-sellers (their bills kept from flying away by four or six large stones, like the roof of a Swiss châlet) with the comfort of the old ladies who occupy the French kiosks, so valuable an advertising medium, can cease to wonder why we, the home of the cheap and evening press, have remained so singularly primitive in our methods of street newspaper distribution. Why should the excellent *Colonnes Rambuteau* of the Paris streets be forgotten, the pillars pasted over with their announcements of the daily theatrical amusements, and forming with their multi-coloured bills a picturesque feature in every Parisian landscape? Addressing as we do readers who in most cases are practical, mention should not be neglected of a feature in the Paris streets which every one who knows London cannot fail to have found at all times almost absolutely wanting, but which we are the only country in the world to have considered as a matter too delicate for consideration. Paris has recently gone even further in this respect; a hundred *châlets de nécessité*, — elegant coloured-marble panelled pavilions,—have been erected throughout the city with a view to supplying at a rate accessible to the poorest (a half-penny) not only the means of comfortably satisfying the necessities of nature, but of affording a cheap lavatory to the public. These and a hundred other well-considered comforts, intended for the benefit of all, it is the duty of the Paris Municipal Council to discuss and adopt. Our authorities, in like manner, should take in hand, even more earnestly than they do, the embellishment of our metropolis, — the largest and richest city in the world; and the question of the laying-out of the Thames Embankment with a view to enlivening its now dreary and dangerous solitude should be foremost among the schemes to be considered.

ANIMAL ACTION IN NATURE AND ART.

A VERY brilliant audience, including the Prince and Princess of Wales and family, the poet-laureate, and not a few eminent artists, was assembled at the Royal Institution on Monday afternoon to witness the exhibition of a large series of photographs from animals in motion, by Mr. Muybridge, of San Francisco, who has for some little time made the subject his special practical study. The exhibitor explained the mechanism by which the production of a series of instantaneous photographs of a passing animal was obtained, and which is already known to those who take any interest in the subject. It is sufficient to remind the reader that the photographic lens is uncovered at the instant of the animal passing it by the breakage of a thread drawn across the path at a suitable height, which allows of the completion of an electric circuit that releases the shutters which hide the lens, and which are actuated by very strong indiarubber springs pulling the lower shutter up and the upper one down, a momentary gap being left through which the lens acts, the exposure being calculated to be hardly more than the five-thousandth of a second in duration of time. So said the lecturer; we should imagine the interval could hardly be so short as this, but that it is very short is a point we draw attention to, for a reason that will presently appear. The lenses are spaced at regular distances, usually 12 in. Some of the photographs obtained from horses were published some time since in the *Field*, where they gave rise to a considerable correspondence.

The exhibition at the Royal Institution included, however, a very large number of photographs, showing a continuous series of the action of horses at every moment of their stride, in walking, "ambling," trotting, cantering, galloping, and leaping; and a most remarkable comment these certainly afforded on the usual representation of this animal in painting. Hardly any of the attitudes usually to be seen in pictures were to be seen in these photographs. Each set of photographs was preceded by a sheet or two of outline sketches of the way in which the horse had been represented in the art of various nations at various times in that particular action or pace; these might have been better drawn, but they were sufficient to show the ideas of the artists as to the position of the legs in the various actions represented, which in most cases differed essentially from the photograph actions. It is worth observing that one of the few correct representations was a drawing of a horse walking, copied from Flaxman; and also that the attitudes of some of the horses of the Parthenon frieze come a good deal nearer to the reality, as revealed by the photographs, than any modern paintings. The lecturer was severe upon what he called the "conventional galloping horse" of the painters, of which a sketch was given, which fairly represented the usual aspect given to that phase of horse action on canvas, and which was further illustrated by a photograph from a well-known picture of a horse-race. Every one will remember the attitude alluded to; the horse with his fore-legs stretched out parallel before him and his hind-legs the same behind him. That, said the lecturer, was an attitude which no horse could ever be in, and its absurdity was intensified when, as in the picture photographed, ten or a dozen horses were represented all in the same attitude at once; an almost absolute impossibility, as a moment's reflection would convince any one, it may be supposed. Admitting that a horse at one moment of his gallop stretches out his legs parallel before and behind, he must at all events have many intermediate positions besides that in order to progress at all, and it could only be by a miracle that a dozen horses could all be in the same portion of their stride at one and the same moment. That is one side of the gallop question; there may, however, be a *per contra* to it on the artist's side, as we will suggest just now.

One or two of the points of special interest in horse action which the photographs brought out may be mentioned. One is, the straight and apparently entirely rigid line of the fore-leg at the moment of the weight coming on it. This position can only, in rapid action, last for an instant, and when seized and rendered stationary in a photograph it conveys the idea of great stiffness of action and almost contradicts the notion of speed; but it is exceedingly interesting as an evidence of the mechanical action by which the limb is brought for one moment into its most rigid position just at the point when the animal's weight is momentarily thrown upon it. Another incident worth notice is that whenever, as happens in the action of trotting and cantering, two feet are off the ground while the two others are on it, the two that are off are invariably in the centre of the action, so to speak; that is to say, the two planted on the ground are in the rear and in the front, the two that are off are hung between them. In the photographs illustrating the action of the horse in leaping, a remarkable point is that in coming down the horse never lands on the two fore-feet simultaneously, as he is almost always represented in painting; one foot is stretched before the other and lands first, breaking the shock, and the other follows. In the photographs from a man leaping a similar action is observable; one foot always strikes the ground before the other, in the intuitive effort to avoid too sudden a shock.

Many other interesting facts brought out by this curious series of photographs might be mentioned, but we must pass these by to come to what is really the gist of the matter from the artistic point of view. How do these revelations of photography really affect the problem of artistic representation? And in regard to this we must say that we believe the conclusion that an artist, to be correct, must represent one or other of the moments of action shown in photography, would be, to some extent, erroneous and misleading. We noticed before the extremely brief interval of exposure of the lens. Now, no spectator in regarding the movements of a horse in action, can follow or disentangle from the complicated movements of the limbs such brief moments of action as this. The spectator inevitably carries away in his eye not the actual position of the limbs at some single instant, but the impression of the combined action of the whole,—an impression compounded of very rapidly succeeding instants of position. And it is this impression which the painter also must seek to convey. If he were to paint one of the positions seen by the photographic lens in "one five-thousandth of a second," he would really be painting what no spectator of the living animal ever does see or can see. It is argued by the inventor of this ingenious process of crystallising momentary action that when this system and its results come to be more generally and popularly known, the public will become dissatisfied with the painter's conventional positions, and will demand greater truth and accuracy. To some extent this is true. The conventional galloping horse of the painter must, we imagine, be discarded after this sharp photographic criticism. He must study to present in a more truthful and characteristic manner the actual impression

of the animal's movements, and the conventional galloping horse certainly does not represent this. But if he were to reproduce precisely any of the actions shown in Mr. Muybridge's series of photographs, he would be condemned not merely for producing what the spectator never has been accustomed to observe in nature, but for producing what the spectator never does and never can see. The movements are too rapid for them to be seen in reality, and the attempt to adopt them in painting would be to fix permanently before the eye an action which is too transient in reality for the eye to take in. The artist must generalise, and from the generalisation produce an attitude which conveys the total impression as the eye sees it. The photographed positions, properly studied, should be most valuable, in affording truer and more exact data for the painter to base his work upon; but it is in this way, and not by copying any one of them, that the impression of the true action will be obtained in the painting. It will be in this respect, we surmise, that the discoveries of the photographic lens will be of real value to the painters of animals. Treated in a more realistic manner, they will probably lead to failure. Of the scientific interest of the results obtained by this ingenious method of defining animal movements there can, however, be no doubt whatever.

CHARACTERISTIC THOROUGHFARES.

THE RUE MONTAGNE DE LA COUR, BRUSSELS.

IT may be said of every street in a great town that it possesses its special character, and this, markedly noticeable in all old cities, is the case even now when whole acres of streets are called up at the bidding of the speculative builder to meet the requirements of increasing population, only that the character peculiar to each street may now be said to apply rather to whole neighbourhoods. But if every street possesses its own special character, every street cannot exactly be termed characteristic: such a quality is reserved alone to a few of the thoroughfares of the great cities. Every one knows which are the most characteristic streets of any town with which he may be familiar, and of them it may be said that the recollection of their character remains always fixed in the memory,—a fact which settles their claim to be termed "characteristic." We speak of Piccadilly, of Regent-street, of the Strand, of Cheapside, of the Paris Boulevards, of Broadway in New York, of the Corso in Rome, of the Montagne de la Cour at Brussels, and so on, as "characteristic," and we all bear away from our visit the unfading recollection of the appearance of each of these eminently characteristic thoroughfares. We speak of one street as dull, of another as lively, of a third as fashionable, of a fourth as the opposite; of one street as possessing a character for having once been the haunt of fashion,—and the squalor that occupies houses once tenanted by wealth only adds a fresh quality to the scene. It is on its occupants, in fact, that depends the character of a street,—a character that stamps deep with its differences the bustling City lane, deserted at night and on the Sundays, and the stately West-end thoroughfare. At home or abroad it is the same; for human nature is the same everywhere, in spite of what some say that in these days of easy communication national peculiarities are being abolished, and the world reduced to one dead level. Fortunately each country yet sufficiently retains its character to give a zest to foreign travel, and afford a field for book-readers and those who make books.

We constantly see described the Boulevards of Paris. Paris is fast becoming almost as familiar to Londoners as is to them their own city; what will it be when the Tunnel is completed? It is not so often that Brussels is described and its several characteristic thoroughfares. Belgium is a country which, while it is well known to certain English travellers, is not, perhaps, sufficiently visited; some of our architects are, it is true, doing their best to Netherlandise our country; to the profession, indeed, the quaint brick buildings and picturesque architecture of Belgium have long been familiar. If it is in search of character that one travels, it is not wanting in the country whose history has been so disturbed, and where are so strangely united two races so profoundly dissimilar as the Flemish and the Walloons. In the capital this character is singularly marked, for side by side with the sturdy English family abroad sailing down the street, the nattiest of Parisian costumes, high-heeled boots hobbling over the terrible cobble-road, may be seen the sturdy Flemish *melkvrow* with her glittering brass milk-cans, with her huge be-petticoated hips, her shawl, muslin cap, and clattering fur-lined wooden shoes. It is for this reason that the Rue Montagne de la Cour may be said to be essentially a characteristic thoroughfare; in the first place its descent, or what is more, its ascent, when one is at the bottom, is a strongly-marked obtuse angle to the level of ordinary streets, leading, as it does, from the lower town, the Flemish quarter, the famous Grand' Place with its Hôtel de Ville and its quaint gabled houses, the brand-new Parisian Boulevard Central, up to the King's Palace and the court end of the town, up to the pretty park and the Rue Royale, passing, it may be imagined, in its sweep through almost every stage of architectural freak that the Brabant capital is capable of showing, from the ponderous burgher architecture of the glorious days of Netherlandish history down to the prim quasi-Parisian architecture of to-day; from the new Bourse, with its strongly-marked resemblance to M. Garnier's new opera-house, up to, at but a short distance, the new monumental Palais de Justice. Down side streets peeps may be caught of older Brussels, of the more industrious part of the town, where still the cranes jutting out from the gables are used to hoist up to the warehouses of the upper stories the produce of a busy home manufacture as in the days of that delightful comedy the "Captain of the Watch," of our old and lamented friend Planché, which some of our readers were happy to see not long ago running a new life at the Lyceum Theatre.

By a walk up and down the Rue Montagne de la Cour one may know all the life of Brussels,—of the generations past and of the present,—from its regal and fashionable life down to the Flemish market folks, with their dog-drawn carts, of which it may be said that not even the most conscientious member of the Society for the Prevention of Cruelty to Animals could utter an objection, so cheerfully and happily do the faithful, well-fed beasts drag along by their master's side his cartload of bright milk-cans or vegetables. Characteristic, indeed, is the Montagne de la Cour and its prolongation, the Rue de la Madeleine. Facing each other, on one side the narrow street that turns into the Grand' Place, with its busy Flemish crowds, its delicately steepled Gothic Hôtel de Ville, and quaint seventeenth-century guild-houses; on the other side, the thoroughly Parisian Passages St. Hubert, with their throng of strangers, little journal, book and glove, stick and boot shops,—a Burlington Arcade ten times enlarged, and with fifty times its bustle and number of passers-by; up further the Montagne de la Cour, more Parisian shops, *modes*, and booksellers and picture-dealers (in whose shops are always to be seen a good selection of works by the sturdy modern Belgian school), the English money-changers, right up to the Place Royale, with its modern church, its princely hotels, and its romantic sprawling statue of Godfrey de Bouillon; in one corner the entrance to the Royal Museum, the Picture Collection, and the Public Library; a few steps distant the newly-erected Palace of the Fine Arts; and opposite it the town residence of the Comte de Flandre, the heir apparent, and, vanishing in the distance, the long line of the aristocratic Rue Royale, with its huge mansions,—in one of which, it will be remembered by readers of Thackeray, the Duchess of Richmond gave her famous ball on the eve of the battle of Waterloo,—the carriages waiting at the door to bear their owners for a drive under the pretty trees in the neighbouring Boulevard de l'Observatoire. It is all in a nutshell,—the Park, the Houses of Parliament, the King's Palace, the Palace of the Duc d'Aremberg, the Courts of Justice, the Bourse, the Grand' Place, the Hôtel de Ville, the Théâtre de la Monnaie,—and the Rue Montagne de la Cour is the leading artery that may be said to connect them all. It is not a broad ambitious street; on the contrary, it is narrow and steep, and tortuous; it is not a Regent-street or a Waterloo-place; there is no street in London that can be said to bear comparison with it, for in our own great metropolis the life of its inhabitants includes a population that almost equals that of the whole of the populous and industrious little kingdom of Belgium, so much of the activity of which may be seen represented in the characteristic Rue Montagne de la Cour.

THE ARCHITECTURAL DRAWINGS AT THE ROYAL SCOTTISH ACADEMY.

ARCHITECTURE is again most meagrely represented at this year's exhibition of the Scottish Academy, the number of drawings being about two dozen. The draughtsmanship of these is generally good, and some of the designs show more than average merit.

The "New Parish Church, Killearn" (David & John Bryce), is a common-place design of Early Gothic type; but the same cannot be said of the "Proposed New Parish Church, Moffat" (Frederick T. Pilkington). There is always a marked individuality in the churches designed by Mr. Pilkington; he aims at striking and picturesque effects, and these he attains by departing from the usual manner of external arrangement, and by giving exaggerated importance to certain details. In this instance the skyline is cut up by several gables, and by large angle pinnacles. The spire is a graceful composition, tapering gradually from base to finial. The openings appear to be deeply recessed, thus securing light and shade, and the detail is of the Decorated period, freely treated.

The "New Catholic Church and Residence, Dunse" (Archibald Macpherson), presents a contrast to the foregoing as regards simplicity of treatment and adherence to time-honoured detail. It has the aspect of a small Early English village church, consisting of nave and chancel, with bell-cot over the chancel arch. The residence is detached from the church, and has no features to distinguish it from an ordinary modern villa. The "Proposed Baptist Church, Hawick" (David A. Crombie), has a decidedly Nonconformist look about it. Over a meagre doorway there is a triple lancet in the main gable, which is flanked by transepts, apparently occupied by staircases leading to a gallery. "St. Giles's Cathedral, Edinburgh: View of Albany Chapel Restored" (Hay & Henderson). This chapel was walled up by the late Mr. Burn during the alterations in the cathedral carried out by him about fifty years ago. It is well that it has escaped the fate of other such appendages to the cathedral which were then utterly swept away. As restored, it will add to the beauty and interest of the interior.

"West St. Giles's Church, Meadow-place, competition design selected by the Presbytery of Edinburgh, with advice of their referee, Mr. J. M. Anderson, honorary secretary of the Royal Institute of British Architects" (Hardy & Wight). This is a church of some importance as regards scale. The architects have chosen the Flamboyant style. The prominent features in the drawing are a large window and a spire of considerable altitude, if the neighbouring buildings are represented upon a true scale. The spire rises from within the tower, with which it is connected by flying buttresses from the angle pinnacles. "South Leith Free Church," by the same architects, was described by us in a recent notice; the spire remains incomplete, and, as here represented, it will give consistency to the composition.

"Rattray-street Church, Dundee" (McCulloch & Fairley), is an unsatisfactory production. It is apparently covered by a roof in one span; the gable is divided into three by narrow buttresses, which terminate in corbelled-out pinnacles. The large window in the centre is superimposed by a projecting arch, and a flèche rises from the roof.

"Presbyterian Church, Interior, as carried out in Mayfield Established Church, Edinburgh" (Hardy & Wight). There is an endeavour here to impart to the pulpit end of the church a distinctive character by flanking that feature with perforated wooden screens. The pulpit takes the form of a platform, and the passages thereto are situated behind the screens. The arrangement is capable of further development than is here attempted.

"Accepted Design for New United Presbyterian Church, West Kilbride," and "Greenbank United Presbyterian Church, in course of erection at Greenock" (Hippolyte J. Blanc), are both carried out in a thorough and spirited manner, the former having a gabled tower and the latter a muscular broached spire. They are in advance of the general run of Nonconformist churches; the style partakes of an Early French Gothic character.

Why "Dunerale Park, the Residence of William Duncan, esq., of Dunerale," as designed by Mr. David Robertson, should have been illustrated and exhibited here we are at a loss to understand. It consists of a central square

block with side wings, such as may be seen scattered far and wide throughout the land, and which some people apparently consider the acme of architectural beauty. "A good, square, substantial house, sir," but hardly a work of art. "Proposed Swimming and Turkish Baths, near Dean Bridge, for the Drumsheugh Baths Company" (John James Barnet), is illustrated by coloured elevation and sections. The roof is covered with red tiles, and the details have an Oriental character, in keeping with the purpose of the building. "Design for Municipal Buildings and Public Offices" (C. & L. Ower), has probably figured in some local competition. It is a pedimented structure surmounted by a dome, without marked individuality or dignity. "Central Station Hotel, Caledonian Railway, Gordon-street, Glasgow" (Robt. Rowland Anderson, A). The architect has put his own stamp upon this building, and has shown considerable ability in the distribution of the fenestration, which is apt to prove monotonous in large structures of many stories divided into numerous rooms. The windows on the ground-floor are boldly arched, having rusticated *voussoirs* carried up to a pointed arch, the actual opening being semicircular. The first-floor windows are arched and divided by shafts with foliated caps, and the upper windows are square-headed and mullioned. The roof is high-pitched and broken by gables, partaking of the Queen Anne manner, and a tower rises at the salient angle, which is rounded off.

"Design for Proposed Building for Trades House, Glasgow" (James Salmon & Son), is a happily-conceived elevation of Early French Renaissance type, consisting of two high-pitched gables divided by a clock-tower. Although the frontage is comparatively narrow, it has an air of dignity often wanting where more space is at command. "Design for a Bank, in Glasgow" (J. Dick Peddie, M.P., R.S.A.), presents evidence of refinement and culture. The leading lines are horizontal, but the eye is carried up by attached and fluted columns to two louvred domes on the roof.

A "Mausoleum erected at Ancrum," designed by Mr. Peddie, is a severe monumental structure surmounted by a dome. It proclaims its purpose unmistakably.

"Design submitted in competition for New Municipal Buildings, Glasgow" (G. Washington Browne), is Classic in style, with tower at angle.

"No. 94, George-street, Edinburgh" (Kinnear & Peddie), is a narrow street frontage savouring of the "free Classic" school. The superstructure sits uneasily upon a plate-glass shop-front.

THE LATE J. J. M'CARTHY, R.H.A., ARCHITECT.

DURING the early days of last month, Mr. J. J. M'Carthy, of Dublin, an architect of some note in his native land, passed away. For the last few years his health had been in a declining state, so his death was not altogether unexpected. It would be an exaggeration to say that the deceased was a great architect, although he earned the reputation of being a respectable one. He certainly was distinguished in the eyes of a large following of his patriotic countrymen and of the members of the community to which he belonged. His architectural practice was chiefly confined to ecclesiastical edifices, cathedral buildings, and churches for the Roman Catholic hierarchy and clergy in Ireland, and for nearly forty years his name has been more or less before the public. In justice to Mr. M'Carthy, it must be stated that he started life with few advantages to serve him, and with small influences in his favour. The Church of which he was an ardent member,—or a strong contingent of it, at least,—patronised the youthful architect, and clung to him for the greater part, if not the whole, of his professional career. For a number of years his hands were pretty full of work, and he designed numerous churches; several in Dublin and environs, and others throughout the provinces. The civil buildings of the deceased architect were, as a rule, the least successful of his works, and his *forte*, or taste, certainly lay in the direction of the Gothic style as applied to ecclesiastical structures.

Among the chief works of the deceased architect are the Church for the Dominican Order, Dominick-street, Dublin; the "Star of the Sea" (a Catholic church at Sandy Mount, Dublin); the church at Dungannon, county Tyrone; a cathedral at Monaghan; the completion of the Roman Catholic cathedral at Armagh; the Rathdrum Catholic Church; a church and collegiate buildings at All Hallows Missionary College, Drumcondra, near Dublin; and a number of other churches, additions, and buildings for the Roman Catholic clergy in Ireland.

At the time of the restoration of St. Patrick's Cathedral, Dublin, effected through the munificence of the late Sir Benjamin Lee Guinness, bart., Mr. M'Carthy, among others, took an active part in the controversy that "restoration" gave rise to, and his criticisms were strong. A valid excuse certainly could be advanced on the part of Mr. McCarthy and his professional brethren, as Mr. Guinness committed the "restoration" entirely to his builder and to the superintendence of his son, who was also a builder, but possessing some abilities as an architectural draughtsman. The Irish baronet, however, stuck to his family builder and his building-architect son, and after a good deal of heartburning, the controversy gradually died out,—not, however, to be entirely forgotten, as it has formed a chapter in the history of Irish architectural "restorations."

It may be as well to add here that the builder and his superintending son, as well as the worthy Irish baronet and merchant prince, have been some years in the grave, and several architects who took part in the controversy have predeceased the subject of our notice.

The deceased architect through his not uneventful life formed several literary and artistic friendships among the distinguished and leading men of the "Old Ireland" and "Young Ireland" schools of politics, though not taking any active public part himself in these organisations. He is credited with having contributed sundry papers on ecclesiastical, architectural, and art subjects to some of the journals and magazines of his time. Some of his architectural drawings were exhibited in the Royal Hibernian Academy from time to time, and several years ago, on the foundation of the Roman Catholic University, Dublin, he was nominated as a professor of architecture, though this appointment was little more than an honorary one. There are no doubt several of the deceased architect's admirers prone to look upon their countryman as the restorer of Gothic architecture in Ireland; but the facts of history are too strong to justify such a claim. The credit of being the father of the Gothic Revival, so far as Ireland is concerned, truly belongs to Francis Johnston, a distinguished native architect, the founder of the Royal Hibernian Academy, and its first president, who, though achieving his greatest triumphs in the Classic style, evidenced a remarkable versatility, and proved by his Castle Chapel, Lower Castle-yard, Dublin, that he was in advance of all his brethren in Ireland in Gothic details. Johnston died in 1828, and long before M'Carthy began to practise. This much, however, must be said, in fair play to the deceased architect, that his buildings, whatever may be their shortcomings, certainly gave an impetus to the study of Gothic architecture in Ireland.

The following works by Mr. M'Carthy are illustrated in the *Builder*:—

Monument in memory of Canon McCarthy, Mallow, Co.—Vol. for 1864, p. 80.
Proposed Roman Catholic University of Ireland, Clonliff, near Dublin.—Vol. for 1864, p. 617.
Cathedral of St. Mac Carthain, Monaghan, Ireland.—Vol. for 1868, p. 677.
Church of St. Foynes, Limerick.—Vol. for 1871, p. 66.
St. Patrick's Church, Dungannon, Ireland.—Vol. for 1871, p. 167.
Roman Catholic Church of St. Mary of the Angels, Dublin.—Vol. for 1873, p. 467.

OBITUARY.

The Late Mr. George Legg.—Mr. George Legg, District Surveyor for the Belgrave and Pimlico division of St. George's, Hanover-square, died on the 13th inst. Mr. Legg was one of the oldest district surveyors, having been first appointed by the Middlesex Magistrates in 1844. He was appointed to the division of St. George's, Hanover-square, by the Metropolitan Board of Works, in 1858. His district, according to the last published return, produced a gross revenue of 328*l.* for the year 1880.

The Council of the Bradford Sanitary Association have appointed Mr. Malcolm Paterson, C.E., of that town, as their engineer. They have already secured a large number of influential subscribers, and are now commencing active operations. This is the first association of the kind established in Yorkshire, although several are flourishing in London, Edinburgh, and other leading towns.

THE CHURCH OF ST. STEPHEN, WALBROOK.

ST. PAUL'S ECCLESIOLOGICAL SOCIETY.

AT a meeting of this society, held on the 7th inst., Major Heales, F.S.A., in the chair,

Mr. Thomas Milbourn, architect, read a long but very interesting paper on the above-named church. We extract the following portions of it:—

The Church of the parish of St. Stephen, Walbrook, as its name implies, was dedicated in honour of St. Stephen, the proto-martyr. The first church stood on the west side of the street known as Walbrook. The second building stood on the east side of the same street, on the site occupied by the present church. The date of the foundation of the church is unknown. The earliest reference to it occurs in the charter of the foundation of the Abbey of St. John, in Colchester, in the county of Essex, in the following words:—

"Præterea ecclesiam S. Stephani super Walbrock, et domum meam petrinam juxta Niewchurch, cum suis appenditiis."*

The Abbey of St. John was founded by Eudo Dapifer (sewer or steward to William the Conqueror, Wm. Rufus, and King Henry I.), in or about A.D. 1096, or about thirty years after the Norman Conquest. It will thus be seen that the said Eudo Dapifer endowed the Abbey of St. John with, among other gifts, the church of St. Stephen-upon-Walbrook, and his house of stone, next Newchurch. Newchurch, here referred to, was afterwards called St. Mary, West Cheap, *alias* Newchurch. The Church of St. Stephen, at this early period, stood, as before mentioned, on the west side of Walbrook, as Stow quaintly describes it, "in place where now standeth the parsonage house, and therefore so much nearer to the brook, even on the bank."

Of this early structure but trifling information is recoverable; that it possessed a belfry is painfully recorded in the coroner's roll for the year 1278, which sets forth that—

"On Friday before the Feast of the Apostles Philip and James (May 1), in the fifth year of the reign of King Edward, the said Chamberlain and Sheriffs were given to understand that William le Clerke was then lying dead, by another death than his rightful death, in the Church of St. Stephen on Wallbrocke, in the Ward of John Adrien.† On hearing which the said Chamberlain and Sheriffs went there, and calling together the good men of that Ward and the Ward of Cheape, being the next Ward, diligent inquisition was made how this happened. Who say that the same William on the Sunday preceding, about mid-day, ascended the belfry of that church, to search for a pigeon's nest there; whereupon it happened that, as he was climbing from beam to beam, holding on by the rafters of the belfry, his feet and limbs failing him, he fell by mischance upon one of the said beams, so that by that fall the whole of his body was ruptured and crushed, by reason whereof he received his death, and died as soon as he came to the ground. And the body was viewed, upon which there was no other hurt, wound, or bruise, save only that the body appeared ruptured and crushed as aforesaid."‡

From an entry in the inventory of the church goods made *temp.* Edward IV., it appears that at the time of the building of the new church, three bells, with all the wheels, gear, &c., to the same, were then remaining in the steeple or belfry of the old church.

In confirmation of Stow's assertion as to the position of this early building being on the west side of Walbrook, I find that in the 28th year of Edward I., A.D. 1300, an inquisition was taken before the Mayor of London, "on Wednesday the morrow of the Translation of St. Benedict" (11th of July), to inquire who were liable to repair the covering over the watercourse of Walbrook "over against the chancel-wall of the church," when the jury empannelled decided that the parishioners of the church were bound to repair, and directions were given to the sheriffs to distrain on the parishioners to do the requisite works.§

In the course of the next 129 years the old church either became so much dilapidated as to need rebuilding, or was found too small to accommodate an increase in the population of the parish; at all events, the parishioners determined on the erection of a new or second church on the site occupied by the present building. The

* "And also the Church of St. Stephen upon Walbrook, and my house of stone next Newchurch, with its appendages."
† Walbrook Ward.
‡ Riley's "Memorials of London," pp. 13, 14.
§ Ibid, pp. 43, 44.

ancient inventory of the goods, relics, and vestments belonging to the church *temp.* Edward IV. fortunately preserves to us, not only the precise date of the commencement of the second building, but also the date of its consecration, and an account of the ceremony of laying the several foundation-stones. The account is written at the end of the paper book containing the inventory, and sets forth that the new church was begun the 11th of May, 7 Henry VI., A.D. 1429, "Maistir Thomas Sothewel" then being parson of both the old and the new church. The account further quaintly states that there was present on the occasion "Rob't Chechile," grocer and alderman of London, the founder of the said new church (and brother to "herry Chechile," then Archbishop of Canterbury), who laid the first stone; he also laid the second stone, in the name of "Will'm Stavndon," who, when living, was a citizen, and "w^t whose gode the Grounde þ^t þ^s newe Chirche stante now on and þ^s howsyn w^t all þ^t þan stode þ^on and þe Chirchyerde w^t þ^s tenament anexid þ^to þ^s whiche abowndiþ^s Jn to bere bynder lane was boutgh' by þ^s seyde Rob't Chechile for ij c Marke of þ^s wardeyns of the Grocers of London and at þ^t time was letyn yerely for xxvj. marke." The record mentions the names of other persons who laid stones, including "Maistir thomas Mapilton þ^s Kyngis mason þan being Maistir Mason of þe seyd Chirche werke"; and adds that "þ^s forseide Rob't Chechile gate and yave to þ^s seide Churche werke c li. and also he made all þ^s tymbir werke of þ^s prosescion plase of his own Coste, and also he yave vs alle þ^s Tymbyr and borde for þ^s ij side ylis." The writer of this account further states that the new church was "halwed" (*i.e.*, hallowed or consecrated) on St. Erkenwald's-day, 17 Henry VI., A.D. 1439. As will be seen by this account, the erection and completion of the church occupied the space of ten years. The paper book before mentioned also contains a description of the site of the church and churchyard, and the several measurements of the same. The details set forth in this record furnish us with the external dimensions of the new church, viz., on the west end, abutting on Walbrook, 66 ft.; on the east end, 67 ft.; on the south side, 115 ft.; and on the north side, 125 ft. Consequently, the church was one of considerable size. Of the internal arrangement and decoration of this second church the inventory affords some interesting evidence, and, by its aid, and that afforded by the churchwardens' accounts and the minutes of vestries, a tolerable idea can be formed as to the style, character, and decoration of the church. That the church was a Gothic structure there can be no doubt, and it was evidently erected in the Early Perpendicular style. The body of the church consisted of a nave, with clearstory, and two side aisles. There was also a belfry, constructed with two, if not more, stories, surmounted by a spire or steeple. The first church appears to have been standing at the time the ancient inventory was taken; but probably it was demolished shortly after the completion of the new building, though, as several of the early books or churchwardens' accounts are missing, I have not been able to discover what became of the materials. The churchwardens' accounts for 1476 contain the following entries relating to the steeple of the second church:—

"It' pay a Whit, carpenter, pur makyng of the thryd flor in the stepull, þ^t was not in hys couienant ..... xiijs. iiijd.
It'm pay a Whit pur makyng of the Newe Roffe in the stepull, and ij flloryz downward..... v li."

In or about 1480 John Kebyll, wheelwright, was paid 5*l.* 6*s.* 8*d.* for timber, making the frame, and hanging five bells in the steeple. In 1483 the platform or story for the organs was erected, as set forth in the following entry:—

"It'm payd to Ray, Carpynt', ffor makyng off þe story ffor the organnys ..... xxxvjs. viijd."

In the churchwardens' accounts for 1536 37 are set forth the several payments for stone work required in the construction of five new windows on the south side of the church, viz.:—

"ffurst. paide for vij. Tonne of Kayne stone, p'ce the Tonne vjs. ijd. Sm^a. ..... xliijs. ijd.
It. for the Custome* of the same ... xxjd.
It. for Craynage and warffage ..... xxjd.
It. paide to Robert lynke, ffremason, for iij. dayes Worke ..... ijs.
It. for the Sawe, to Sawe the stone, for vj dayes ..... vijd."

* Duty.

In the accounts for 1548-49 we have evidence of the changes consequent upon the Reformation, such as the sale of the cross in the churchyard and the altar-stones in the chapel. In the following year, 1549-50, still further damage was done to the interior of the church by the removal and sale of the monumental brasses. From a bill for works executed internally and externally to the church, and dated 1600, it appears that William Massey, painter, and one of the churchwardens, was employed to execute the several works, at a cost of 72*l.* 6*s.* 4*d.*; of this amount 4*l.* 6*s.* 6*d.* was expended in painting "twelve angels in oil, with angels above them; the arms of the Grocers' Company, and all the other angels in both the side aisles, holding shields and arms." This account also furnishes evidence that there were twenty large columns or pillars in the church, besides smaller ones, and that a wainscot, probably a screen, parted the body of the church from the chancel and the pews in the choir.

At a meeting of vestry held March 22, 1653, it having been reported that Mr. Ewer, "then Clarke," had "Cutt away and impaired part of the round quarter of one of the pillars of the church," the vestry viewed the same, and found there was no cause for it besides "his owne fancie of squaring his wife's pew joyning to the said pillar"; and on returning to the vestry, finding the pillar had been much "weakened, dishaped, and deformed, and not fitt to remaine," resolved that he should put the pillar and wainscot into the same "forme, order, and strength it was before"; the said work to be done by him within convenient time, otherwise the same to be executed by the Vestry, and the cost deducted out of his "following quarter's wages."

"And they did then allsoe further order, that henceforward hee doe not p'sume to appoint any worke to be done in the Church, or to anything belonging therevnto (except it bee the amendm^t of a locke or such small matter vnder the valewe of 12d.)."

It also appears from the minutes that the vestry, before separating, agreed to release him from the cost of making good the damage done to the pillar.

No mention of the Great Fire is made in the accounts for the year 1666, neither is the Plague mentioned in the preceding account.

The churchwardens' accounts from Lady-Day, 1667 to the present year form a complete and perfect series, and contain matter of great interest relating to the history of the present building. In the account of John Simpson, from Lady-Day, 1672, to Lady-Day, 1673, are the following entries:—

"Y^e 7th March. Pd. for a dinner at y^e Swan in old ffish Streete to entert^a Dr. Wren and other Suruaers w^th y^e Vestry and others. Came to ... £9 9 0
P^d to y^e Suruaer Gennarell p ord^r of Vestrey 20 Ginnes ffor a gratuetey to his Ladey to incuridg & hastin y^e rebuilding y^e Church. Came to 21 10 0"

In 1670, an Act of Parliament was passed for rebuilding the City of London, for the uniting of parishes, and for rebuilding the cathedral and parochial churches destroyed by the Fire, by which Act the parishes of St. Stephen Walbrook and St. Benet Sherehog were united. By this Act it was also provided that the Church of St. Stephen should be the parish church of the two parishes so united. At the vestry held the 4th of December, 1672, some of the vestrymen were sent to attend at the Court of Assistants of the Grocers' Company, then sitting at the Grocers' Hall, to "begg their presence at y^e laying y^e first foundation stones of y^e Church of St. Stephen Walbrook on the 17th inst., the said Company being patrons of the said church." In a memorandum following the minutes of this meeting, and dated 17th of December, 1672, it is set forth that the first stones in rebuilding the church were laid "in y^e east foundation." These stones were sixteen in number, the first being laid by the then Lord Mayor, Sir Robert Hanson. At a vestry held 19th of February, 167$\frac{3}{4}$, it was ordered that:—

"Dr. Christopher Wren, in consideration of his great care and extraordinary pains taken in y^e design of y^e Church, and assisting in y^e rebuilding y^e same, be presente him or his Ladey 20 guinneys in a silke purse, and Mr. Woodrof y^e surveyor with 5 guinneys, and y^t they both be invited and desired to dine w^th y^e Vestry at y^e Swan in olde fish Streete y^e next Vestry Day, w^ch is appoynted this day fourtnigh."

At a vestry held the 31st of May, 1678, it was ordered that the church be forthwith pewed, "the moddell for the work in scantlings and workmanship to be like St. Nicholas Coleabby." At a vestry held the 11th of June, 1678, it was agreed that Roger Dainer and Stephen Colledge should pew the church. By an order dated July 10, 1679, and signed by the Bishop of London and James Edwards, Lord Mayor of London, it was directed that the works to the tower should be carried on. This order was issued in consequence of the tower remaining incomplete.

Next to St. Paul's Cathedral, St. Stephen's Church, Walbrook, is Sir Christopher Wren's finest work, and it redounds to his credit that he should have left such a handsome monument to his memory in the parish of his nativity and long residence. One writer has gone so far as to assert that "Italy cannot produce a modern edifice to equal it in taste, proportion, and beauty." The plan of the church is an oblong or parallelogram, the nave, aisles, transept, and chancel being produced by an arrangement of Corinthian columns, thus giving a cruciform appearance; and the columns being raised on pedestals the same height as the pews enabled the architect to give them a light and elegant proportion without any want of strength. Another writer speaks of the setting-up of the dome of the church as "a kind of probationary trial" of the architect's, "previous to his gigantic operation of fixing one on his octangular superstructure in the centre of his new St. Paul's." The length of the church within the walls is 82 ft. 6 in., by a width of 59 ft. 6 in. The height to the soffit of the ceiling of the side aisles is 36 ft., and to the top of the dome 63 ft.

Newcourt, in his "Repertorium," quoting from Stow, says that the tower of the second church was not destroyed by the fire or the bells melted. This is probably correct, but I infer from the nature of the work of the present tower, internally and externally, also from the great weight and height of the stonework, that no part of the stonework of the old tower was utilised, unless it was the foundations, and this is very doubtful.

During the recent repairs to the church internally and externally, executed under my supervision, I was instructed to remove the whole of the unsightly cement casing of the tower and north wall. In so doing I discovered part of the north wall of the old church at the west end of the north aisle, next the vestry-room, and against which a building had evidently stood jutting into Stocks's Market. On removing the cement work in the centre of the north wall, I found the north door* bricked up as described in the Vestry minutes. I re-lined the face of this brickwork, and filled up the opening with stone to match the other work, taking care to retain the outline of the old opening. I also removed the face of the old wall at the west end, and faced the same with stonework corresponding with the other parts. On removing the cement work from the tower I found the stone facing had been considerably damaged in hacking down the stones to form a key for the cement. I was, therefore, compelled to re-dress the stones as far as practicable to remove the chisel marks, all decayed stones being removed and replaced with new. The several walls were not rendered over with cement early in the year 1813, as a writer at that date fully describes the architectural features of the church; but probably it was done later in the year, as I find a contract was entered into the 25th of June in that year for repairs to the church, at a cost of 1,633*l.*; therefore the gentleman who referred to what he termed "skinning St. Stephen's," in concluding a very animated speech at the Mansion House on the occasion of a meeting held to inaugurate a society for the protection of City churches, in 1880, and who declared his opinion that "Sir Christopher Wren never intended the stones to be exposed," formed a wrong conclusion. The north wall is divided into two stories, the first cased with Kentish rag laid in irregular courses, and the second or top story faced with Bath stone. On removing the cement work I discovered that the first story had been surmounted with a string-course, but this, as also the Doric architrave mouldings and cherub key-stones to the oval windows, had

* Of the at one time intended north porch, for which designs were prepared by Wren. The project was abandoned, and the doorway ordered to be bricked up, on the ground (as recorded in the minutes of a Vestry held September 11th, 1685) that the "intended dore way for a porch into the Stocks Market was at the present a greate nuoyance to the church by reason of the offensive stincks and sents y^t came from severall shedds y^t joyned to it, as a slaughter-house, herbe shop, &c."

been chopped off to receive the cement work. I replaced the string-course, but was unable to do other than carefully dress down the face of the stonework so as to remove the marks of the chisel. I was not able to remove the cement work from the walls of the clearstory, for upon examination of the same, to my surprise I found the walls were faced with red bricks, with Bath stone dressings to the windows, and that the whole had been cruelly hacked to key the cement.

The whole of the boarded floors and joists of the church are tainted with dry rot, and should be removed and replaced with new, otherwise ere long it will considerably injure the woodwork of the pews. I have strongly urged that the whole surface should be concreted and covered with asphalte, relaying all memorial stones *in situ*, in the same manner as I have recently treated the aisles in the Church of St. Mildred, Bread street.

I must not omit to mention that on examination of the ornamental work in the panels of the dome, some of which projects as much as 15 in. from the face of the panels, I found the material to be hair mortar, evidently well kneaded by hand to the required shape, and, whilst damp, trimmed up with some sharp instrument.

A brief discussion ensued, in which the Chairman, Mr. Somers Clarke, and other gentlemen, took part, and the thanks of the meeting were given to Mr. Milbourn for his interesting paper.*

ARCHITECTURAL TERRA-COTTAS IN GREECE AND HER ITALIAN COLONIES.

THE results of researches made by Herr R. Borrmann, in conjunction with Herren W. Dörpfeld and Fr. Gräber, on the classic terra-cottas found in Greece, Sicily, and Southern Italy, form the subject of a lecture recently delivered by the former gentleman before the Berlin Society of Architects, and printed in the Winkelmann Programme of the Berlin Archæological Society for 1881. Their studies were confined to the terra-cotta material used for the artistic and constructive formation of the classic roof, and treat specially, and firstly, of the discovery at Olympia of an incrustation of entablatures (*geisa*) of ancient Greek edifices by U-shaped or angular-moulded pieces of clay fastened to the stone, such as are best seen at the treasury of the Gelenses at Olympia and at the temple of the centre citadel at Selinus. The decoration of those mouldings consists generally of a single or double network pattern, sometimes also of a wave ornament. Upon them rests immediately the crowning of the entablature, either in the form of a *cyma recta* running round it or a series of antefixæ arranged over the eaves-course and masking the calypteræ. Between the two systems is the peculiar crowning of the temple of the centre citadel at Selinus, with its continuous cornice of antefixæ pierced for the outflow of water. It is proved that other buildings at Selinus have had this system in conjunction with entablature slabs; the latter were present also at Gela, and, judging from the fragments found at the various places, in the three temples at Syracuse, — those of Athene, Apollo, and the Olympeion. Perfectly similar pieces were also formerly found by the Duc de Luynes at Metaponte, and recently at Croton and Pæstum, while, strangely enough, no remnants of it have been discovered in Greece, Olympia excepted. On the other hand, an older technique and mode of construction may be proved at earlier seats of culture, such as Orchomenos, Mycenæ, and Olympia, the most remarkable example of which is afforded by the roof of the Olympian Heraion, discovered in all its characteristic parts. The latter shows the so-called ridge and gutter-tile system, with this difference, that the tiles and copings are not of equal size, but that the former are double the size, consequently have a flatter curvature than the semicircular calypteræ. The latter end at the knob with disc-like antefixæ, while the ridge was secured by heavy semicircular coping tiles, the finials of which, again, were two colossal acroteria of a diameter of over 7 ft. A characteristic mark of this oldest description of architectural terra-cottas was a blackish brown, sometimes reddish brown, varnish-like coating of all outside faces. This varnish shading was burnt in with the moulded pieces, upon which were painted afterwards the colours required for ornamentation, such as violet, yellow, and white. Another distinguishing feature is the preference shown for bold plastic forms,—such as rolls, rosettes, heavily curved and intersected cymatiæ,—and, as regards their decorative painting, the application of linear, or geometrically constructed patterns, such as a series of leaves, the latter half-rounded off, zigzag and chessboard patterns, rosettes, and plaited bands.

In complete contrast to the dark varnish ground of the terra-cottas just described, we find in those of the succeeding epoch throughout a warm yellow clay used as a ground, upon which the drawings are painted in dark colours, generally in a regular alternative of blackish brown and red. The ornamentation, although for the greater part keeping to the severe character of the earlier examples described, passes gradually into freer treatment of such patterns as anthemiæ and variously-formed leaf-work. For roofing, the bent tiles were replaced by flat tiles, with lateral bands and specially shaped points for covering the joints, and, at first, with half-round, later (in Sicily throughout) roof-like calypteræ. The original forms of the cyma are various. In Greece, the profile employed with preference is one being flat on the under side and having a strong swelling on the upper, the characteristic ornamentation of which is a system of bell-shaped flowers and palm-leaves turned in both directions, up and down. Several profiles, different altogether in form, and reminding us of Egyptian concaves, with peculiar leaf-work strongly chamfered or triangular-shaped, and a broad abacus above, have been found at Syracuse and Gela; also in the Gela treasury at Olympia. A contrast to this type is afforded by the cyma forms discovered in the western towns of Sicily (Selinus, Agrigentum, Himera), and consisting principally of flat surfaces and cymatiæ, the inorganic formation of which is expressed especially by the accumulation and arrangement over each other of equal-sized members.

The gurgoyles are pipes projecting from the gutter, and are decorated at their openings with a disc in the form of a rosette. Later, we meet with lions' faces, at first of mannered, but gradually more natural forms.

The objects being mostly formed of a coarse or unclean material, a fine coating of carefully cleaned clay was put on the outside faces which were to be painted. The drawing was slightly scratched in, a pair of compasses being employed for that purpose, wherever practicable, for rosettes, entwined work, and even for the outlines of leaves. Another mode of procedure consisted in engraving the drawing in the clay object, whence arose the impressed patterns with fine raised edges found in classic art. The outlines thus formed by either of those methods were filled with colour, and the objects hardened by one burning. Only in a few cases they were burned twice, once before, the second time after, painting. Stucco grounds, which would have afforded more scope for rich painting than was possible within the narrow limits supplied by the encaustic process of the terra-cottas, do not occur in Greek art, and appear to have come into use, as finds at Pompeii show, only since the Roman Empire.

Researches into the mode of applying colours, which is of importance also in the classification of vases, have proved that a new technique gradually began to prevail about the beginning of the fifth century B.C., in which the ground was not, as hitherto, light, and the drawing in darker tones, but the reverse, namely, the ground black, the drawing a light yellow, sometimes red. The ornamentation begins to display the developed forms of the flourishing periods of Greek art, in which free-hand drawing asserts itself in preference to the ornamentation, principally produced by mechanical methods, of earlier periods. The adornment of cymæ consists principally of the charming, always varying anthemia patterns. The antefixæ and ridge-tiles bear palm-leaves, which unfold themselves between volutes or form acanthus bells. The faces of tiles show, in place of the former severe entwined bands, rosettes or wave ornaments, rich scrolls or laurel-beads.

The close of the statistic development is formed by the preponderatingly plastic patterns of the later Greek or Hellenistic epoch, during which colour gradually disappears, being applied only for marking immaterial details. Much-fancied *motifs* in the cyma of this period are, besides plastic anthemiæ, branches growing out of acanthus-bells, which do no longer follow the movements of the profile, but appear to be simply attached outside. Upon this more or less plastic tendency, in which, as in the later Etruscan clay forms, figures became more prominent, Roman art followed, without displaying important local or temporal differences. On the contrary, the forms taken from Hellenic and later Italian art, and gradually varied, became more widely disseminated over the world, without, however, ever attaining either artistically or constructively the excellence of their models.

* Some further particulars of the works carried out at St. Stephen's, Walbrook, by Mr. Milbourn appeared in the *Builder* nearly a year ago (see vol. xl., p. 321).

THE INSURANCE OF WATER FITTINGS.

IT appears that the Birmingham Waterworks Committee contemplate what is termed "Insurance of Water-Supply Fittings,"—that is, it may be assumed, these will be maintained in order by inspection and repair for an annual payment. One shilling per annum on low rentals, increased in proportion of rental; 2s. 6d. extra on bath, and 5s. extra on water-closet fittings. If the tenants will submit to examinations and pay such excessive charges, well and good; no outside person need complain. But experience induces me to doubt the fairness or the acceptance of the terms. That both water and gas fittings need looking after at short intervals is certain; and it will be as much in the interest of the sellers of water and gas to preserve fittings in good order, as it will be of the users so to have them. It is a fact notorious to waterworks engineers that, as a rule, more water is wasted by defective mains and fittings than is legitimately put to any good use. Take the metropolis, where, on an average, about 31 gallons per head per day are supplied all the year round; or, at eight persons per house, about 250 gallons are supplied for each house per day. Who believes that this is all fairly used? As the water supplied to the metropolis is for the most part pumped,—raised by steam power paid for by the companies,—one may fairly conclude that it is rather more the interest of the supplier than of the consumer that the fittings should be maintained in good order. The truth is, every water company or corporation supplying water by sale will, as an integral part of their business, some day soon, establish unceasing inspection and repairs of house-fittings for the ordinary water rental, as a question of economy. Over and over again, water company corporations and Local Boards have been driven almost to despair because the waste of water in their respective districts has been so enormous, running up to the absurd volume of 120 gallons per head, or 600 or 700 gallons per house per day.

To this condition did Croydon come some time since, so that with other places it had to discontinue constant service, and go to intermittent service to diminish the waste from defective mains and leaking services; but this did not prove a cure. Inspection and repairs of fittings have, however, stopped the waste. A large proportion of London is now on intermittent service, a small army of turn-cocks being employed day by day to turn the water on for one or two hours, and then to shut it off again. If these turn-cocks were inspectors and fitters looking after and repairing at once the fittings, constant service would be found to be by far the most economical mode of water-supply. This statement need not rest upon assertion, as it has been well based on fact in several places. The truth is, no public water-supply is complete unless unceasing supervision, inspection, and repairs form part of the system. This and this alone will be the best, the cheapest, and the readiest form of water-fittings insurance.

As to *Gasfittings*,—gas is sold by meter; and consequently, if it is unduly wasted it is paid for. Companies may, therefore, come to the erroneous conclusion that waste is no concern of theirs, but rather, as more gas has to be paid for, is to their advantage. This, however, is a blind and impotent conclusion, as extravagant waste of any serviceable commodity cannot, in the long run, be good for any party. Wasting gas by leakage is dangerous as leading to explosions, but leakage forms only a small part of the evil of unjustifiable waste. Defective burners must be answerable for the worst and most damaging form of waste, as the gas passes partially unconsumed and unoxygenated, giving a blurred, smoky, and sulphurous flame, injuring all with which its fumes come into contact, and so discrediting a use of gas. Probably nine-tenths of the

complaints against gas arise in consequence of defective burners; if, therefore, gas companies employed examiners and fitters to inspect and repair or renew all gas-burners at short intervals, they would be material gainers even pecuniarily, as they would preserve customers and add to their number. This, then, for gas companies will be the best form of Gasfitting Insurance.

Electric lighting stares gas companies in the face boldly and unflinchingly, and if gas is to hold its own it must be burned in the best and cheapest manner; that is, by and with the most perfect fittings, retained perfect.

ROBERT RAWLINSON.

P.S.—In the meantime, periodical inspections of house-drains, water-closets, and their ventilation, water-supply fittings, and gas-supply fittings are being arranged for by private parties, both in London and in Dublin, at a moderate annual charge, and if the inspecting is regular and well done, it will be most beneficial to householders.

BASING HOUSE, PECKHAM ROAD.

AN interesting relic of Old Camberwell will in all probability shortly disappear. This relic is the old house called sometimes the old Manor House and sometimes Basing House, on the south side of Peckham-road, near Rye-lane, at present used as a school by Mrs. Tattersall, who has occupied the premises for the last five-and-twenty years.

The house would seem to have been a portion of a mansion forming part of an estate purchased by William Gardyner, of Bermondsey, in the reign of Elizabeth. The family of the Gardyners appear to have lived in this house for several generations, and there are a number of letters in the State Paper Office, addressed by different members of the family to various persons of distinction, dated from "Basings in Peckham." Sir Thomas Gardyner, who was knighted by Charles I., and became Lord of the Manor of Basing, appears to have been a kind of Dr. Cumming in his day, for in a letter to Lord Dorchester, dated 1630, extracts from which are given in Blanch's "History of Camberwell," he warns the then Secretary of State that in thirty-five years "the number of the beast shall be fulfilled," and intimates his intention of writing a book on the subject. Sir Thomas died, however, two years after this letter was written, and it does not appear that his intention with regard to the book was ever carried out.

George Gardyner, son of Sir Thomas, sold the manor of Basing in 1651.

The house has lost most of its characteristic features from additions and alterations made at various periods, but it has a good oak staircase and some wood-carvings on the upper floor, of the time of Charles II.

JUDGE JEFFREYS'S HOUSE, ST. JAMES'S PARK.

A SCAFFOLD has been recently put up in front of the house, No. 13, Delahay-street, Westminster. This house, the back of which faces towards St. James's Park, was formerly No. 23, Duke-street, and was the town residence of the infamous Jeffreys. It is a plain red-brick building, with a bold wooden cornice, and is not without a certain dignity and justness of proportion, so strangely wanting in most modern structures, and it will be a pity if by any injudicious additions or alterations these characteristics are destroyed. Jeffreys having obtained a grant from Charles II. of a plot of ground on the east side of St. James's Park, employed an architect to build him a very magnificent house with a private chapel and extensive offices. The architect appears never to have been paid for his services, Jeffreys contriving to put him off upon one pretext or another, until the Judge was compelled to seek refuge in the Tower, pursued by the execrations of an infuriated populace. A similar treatment of Henry Holland, the architect of old Carlton House and old Drury-lane Theatre, by Sheridan, is related in the *Builder* for 1855 (vol. xiii., p. 243).

Jeffreys's house is the second house northward of Storey's-gate fronting towards St. James's Park, and is readily distinguished by the stone steps leading down to the Park, and a passage-way through the ground-floor leading into Delahay-street. The chapel, which was to the north of the house, was pulled down a few years ago, and a large house with a stone front erected upon the site. Here the mob assembled after the Judge's fall in 1689, and read upon the door of his house, with shouts of laughter, the announcement of the sale of his property. (Macaulay's History, ii., p. 77.)

THE BOILER EXPLOSIONS BILL.

THIS Bill, which was read a second time on February 22nd, is one of some importance, and seeks, by indirect means, to put some workmen in a safer position than they now occupy. The Bill does not include within its provisions any boiler used exclusively for domestic purposes, or in the service of her Majesty, or on board a ship with a Board of Trade certificate. As we have said, the Bill seeks to effect its object by indirect means, for its immediate object is to establish a Court of Inquiry into boiler explosions. As soon as such an explosion has taken place, notice is to be sent to the Board of Trade within twenty-four hours, with full details concerning the explosion. Then there is to be a preliminary inquiry by an engineer appointed by the Board of Trade, and subsequently, if necessary, a formal investigation in open court by two engineers and a lawyer. This court will, therefore, be very analogous to what is commonly known as the Wreck Commissioners' Court, though the latter is by no means a Court of Inquiry into wrecks alone, but into all shipping casualties, even to the blowing up of boilers. On the other hand, the proposed Boiler Explosions Court differs in two particulars. It is to be presided over by one of the engineers and not by the lawyer. The Wreck Commissioner has power to deal with the certificates of officers of the mercantile marine; here, the Court can only report to the Board of Trade, and unless there has been such gross negligence as to enable the Public Prosecutor to be set in motion, so far as we can see the report will be the end of the proceedings. Hence, any effect that this Bill, if it becomes law, can have will be solely indirect. We confess that, as this Court is, to use the words of Mr. Mason's Bill, to be composed of "competent engineers" and a "competent" lawyer (though we would suggest that, as regards the last "competent," it should find a substitute in "a stipendiary magistrate or a barrister of not less than seven years' standing"), it should be empowered to inflict some kind of punishment if it thinks it desirable, as a sequel to its inquiry. This, however, may possibly be a suggestion too thorough-going in its nature, but we confess we should regard the Bill as more likely to be effective if the Court had some such power, and not a mere reporting jurisdiction. It is in the interest both of masters and men that the Bill, if it is to become law, should be made as effective as may be, with as little hindrance to manufacturing enterprise as possible.

VANDALISM IN VIENNA.

IN the Hofburg, the principal palace of the Austrian emperor in Vienna, which is about to be considerably enlarged and partially rebuilt, workmen have been recently engaged in fitting up special telephone wires from the emperor's library to the other parts of the palace. The wires had to be carried in one direction through the so-called Crown Prince's Passage, whose walls are covered with very large and valuable paintings, all by old masters. Last week, on going his rounds through this portion of the edifice, the Captain of the Palace discovered, to his horror, that the eyes of all the figures in these pictures had been cut out. Respecting the perpetrator and his motives nothing is yet known, but a strict inquiry has been instituted into the circumstances of the case.

A MONUMENTAL FOUNTAIN.

A CITIZEN of Leipsic who recently died left in his will the sum of 150,000 marks (7,500*l.*) to the Municipal authorities for the erection in that city of a "Monumental Fountain." It has accordingly been decided to open a competition for designs for the work. The authorities have attached to the programme the condition that the successful competitor shall undertake to execute the entire work according to his own plan for the above-mentioned sum. The first premium is 100*l.*, the second 75*l.* The judges are Professor Hähnel, of Dresden; Professor Anton Springer, of Leipsic; and the City Architect, Herr Licht, of the same place.

A CHEAP GAS FOR HEATING AND MOTIVE POWER.

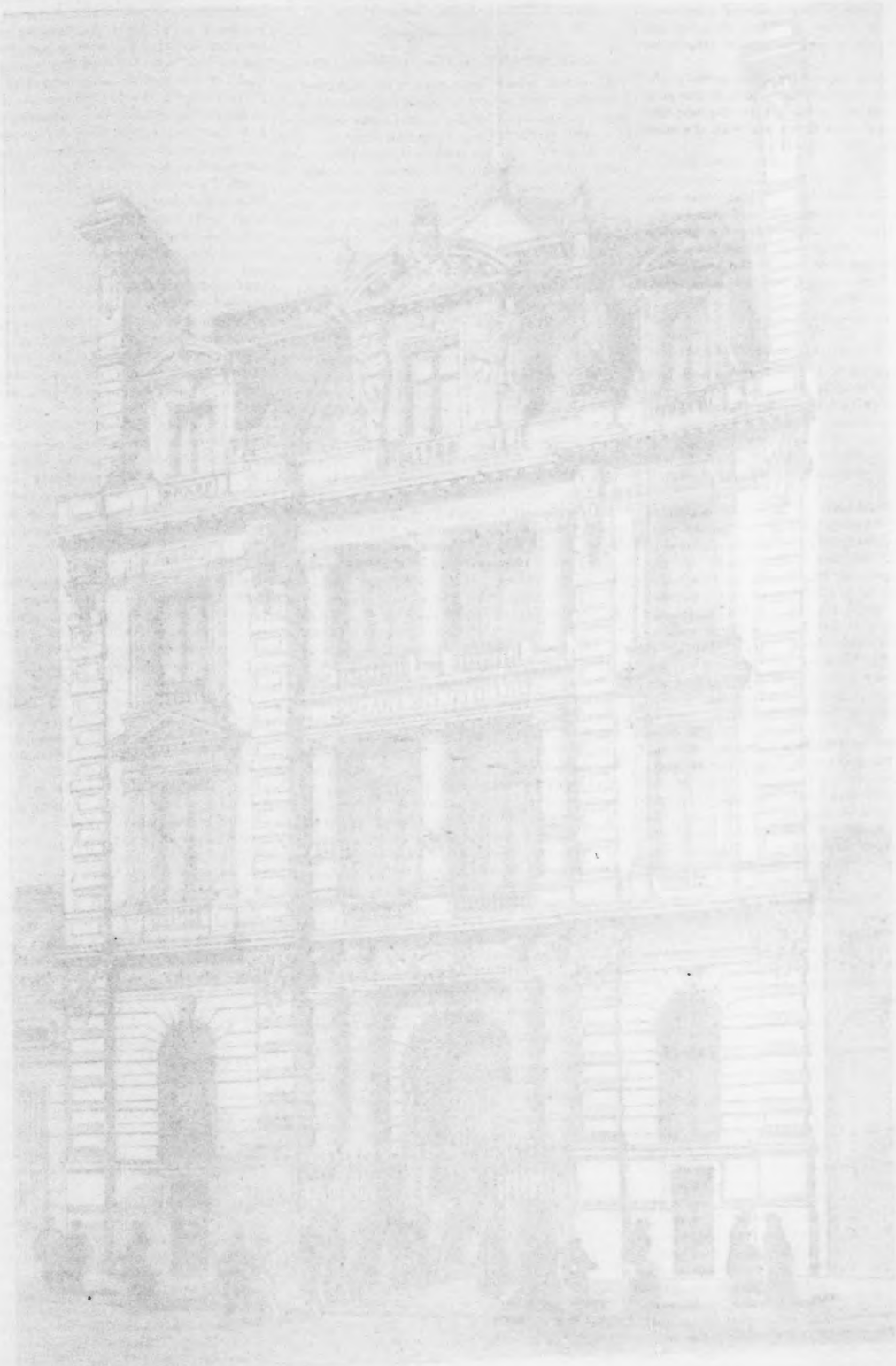
MR. J. EMERSON DOWSON delivered a lecture before the members of the Society of Arts lately, on the production and use of gas for the purposes of heating and motive power. The lecturer said that all were so accustomed to the use of coal gas for lighting purposes that by many it was looked upon as almost a necessity. Fifty years ago nearly all towns were lighted, or said to be lighted, with miserable oil lamps, and now the capital publicly invested in works for the supply of gas in the United Kingdom amounted to something like 45 millions, and for London alone it was over 13 millions sterling. The manufacture of lighting gas on so large a scale had naturally led to the improvement and cheapening of its production, and this had led to its more extensive use for lighting, and to its adoption, to a certain extent, for heating and motive power. This more general use had led them to become familiar with the advantages of gas as a fuel; but they had also learnt the unpleasant fact that its use for such a purpose was generally attended with much more expense than when coal or coke fires were used. They knew that gas engines were, theoretically, more efficient than hot air or steam engines, and that they could not burst like steam boilers; but their general adoption was greatly impeded by the high price of the fuel they required. Ordinary coal gas was admirably adapted for cooking and innumerable heating purposes, but, in the hands of careless persons it was certainly not economical compared with coal or coke. It had long been established that highly-heating non-luminous gases could be produced by decomposing steam in the presence of incandescent carbon, and it only remained to prove that the process could be carried out in a simple way at a moderate cost. The lecturer then explained Dr. Siemens's system, and the modifications of Messrs. Kukhan's apparatus. He then described his own improvements in the manufacture of gas, by which he passed a mixture of steam and air through a fire, but he had adopted special means for producing and superheating the steam, and for maintaining all the conditions of working constant and simple, and by so doing he had sensibly improved the quality of the gas produced. Gas manufactured under the more recent improvements cost a mere trifle. He observed that his gas could be rapidly produced, and at a very low cost, even if made in small quantities. He found that at the thirteen gas companies in and around the metropolis, the total net cost of 1,000 cubic feet of 14 candle-power gas sold was over 2*s.* 4½*d.*, after allowing for the sale of residuals and without anything for dividends or interest on the capital outlay. It had been suggested that when gas was made solely for heating purposes it need not be purified at all, or very slightly, but he protested against the adoption of such a suggestion. That gas for motive power would play a most important part in the future was beyond doubt.

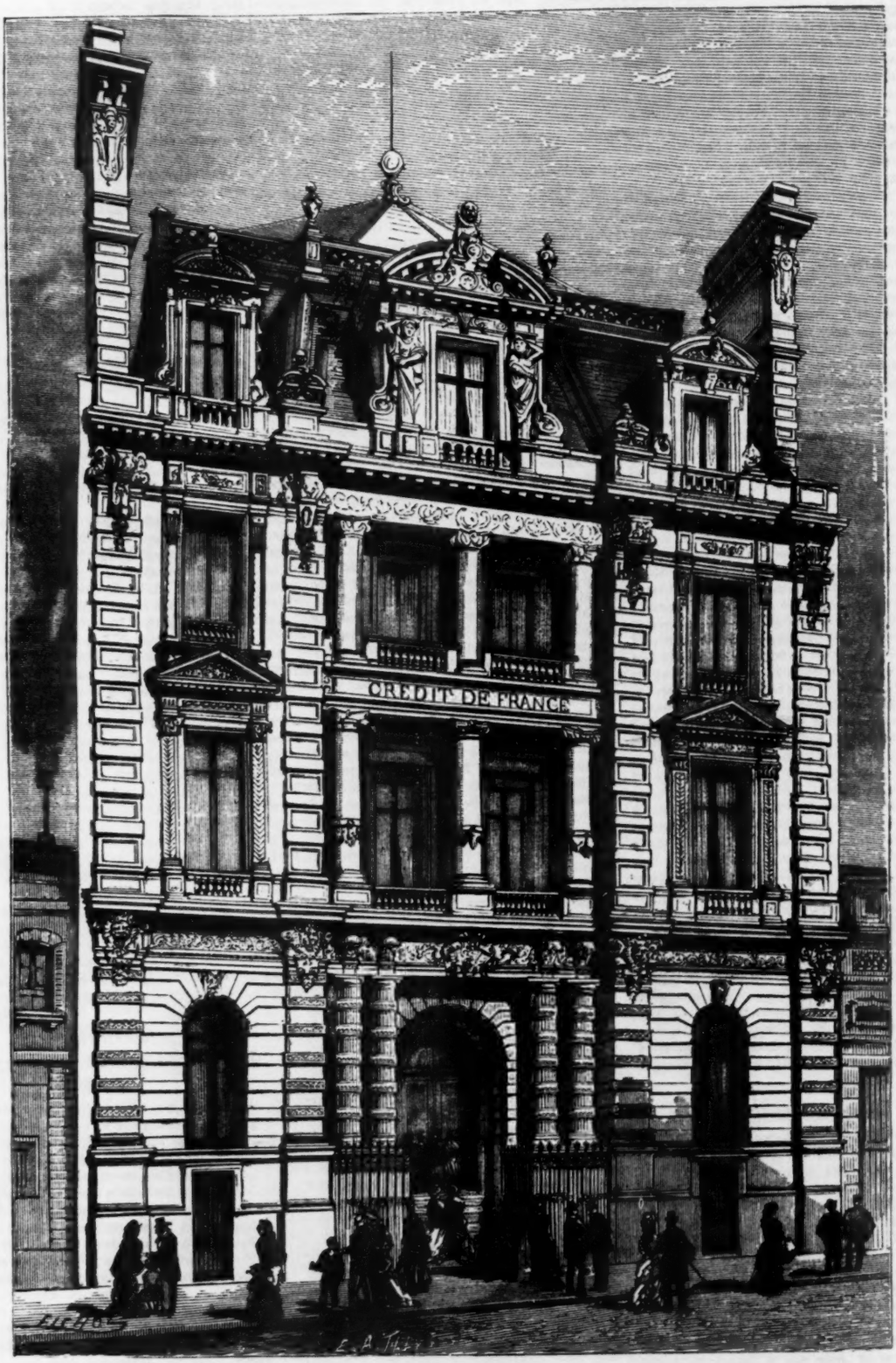
THE LARGEST CITIES OF ITALY.

THE populations of the twelve largest cities of Italy, according to the last census, which was taken in December, 1881, are as follow:—Naples, 495,000; Milan, 322,000; Rome, 300,000; Turin, 253,000; Palermo, 245,000; Genoa, 180,000; Florence, 163,000; Venice, 133,000; Messina, 127,000; Bologna, 123,000; Catania, 101,000; and Leghorn, 98,000. Since 1871 Rome and Milan have increased the most rapidly, each having added 23 per cent. to their population; Catania has added 20 per cent.; Turin, 19 per cent.; Messina, 13 per cent.; Palermo, 12 per cent.; and Naples, 10 per cent. Venice has only added 3 per cent. to her inhabitants since 1871, while Florence has 4,000 fewer than ten years ago, owing to the removal of the seat of government to Rome.

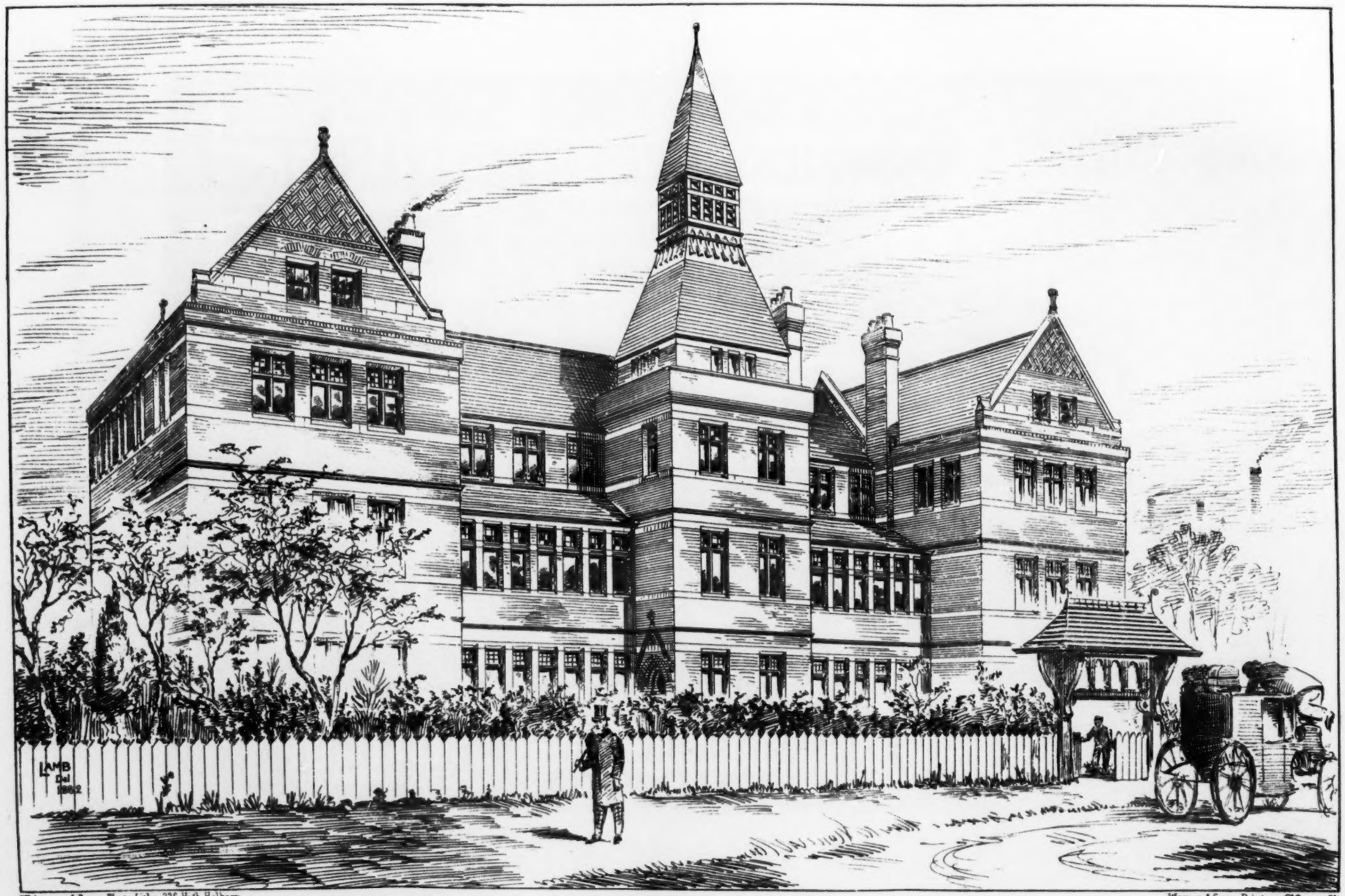
NEW INFIRMARY, ALTRINCHAM UNION, KNUTSFORD, CHESHIRE.

THE present Infirmary having been found too small, the Guardians decided to erect a new one, and use the old one for imbeciles, &c. The contract has been let to Mr. Martin Stone, builder, of Altrincham, for 5,750*l.* This includes a new boundary wall round the site. The architects are Messrs. Tate & Popplewell, of 20, Cooper-street, Manchester.





THE NEW "HÔTEL DU CRÉDIT DE FRANCE," PARIS.—M. Revel, Architect.



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SCHOOLS FOR ORPHANS OF FOREIGNERS, GLASGOW.—MR. JAS. A. BURTON, ARCHITECT.

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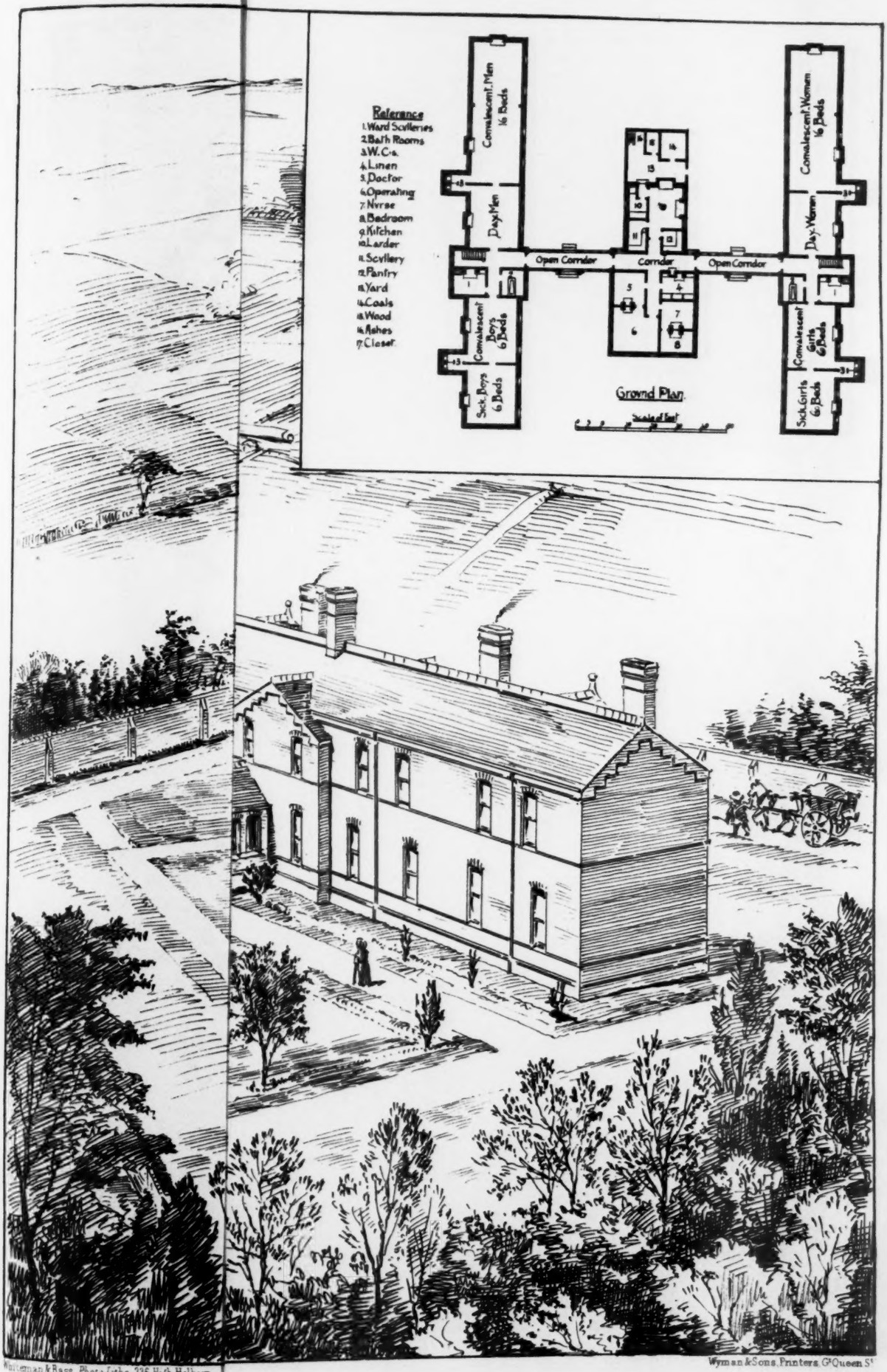

Whiteman & Bass. *Photo-Litho* 236, High Holborn.

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PLEWELL, ARCHITECTS.

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SCHOOLS FOR ORPHANS OF FOREIGNERS, GLASGOW.—Mr. Jas. A. Burton, Architect.

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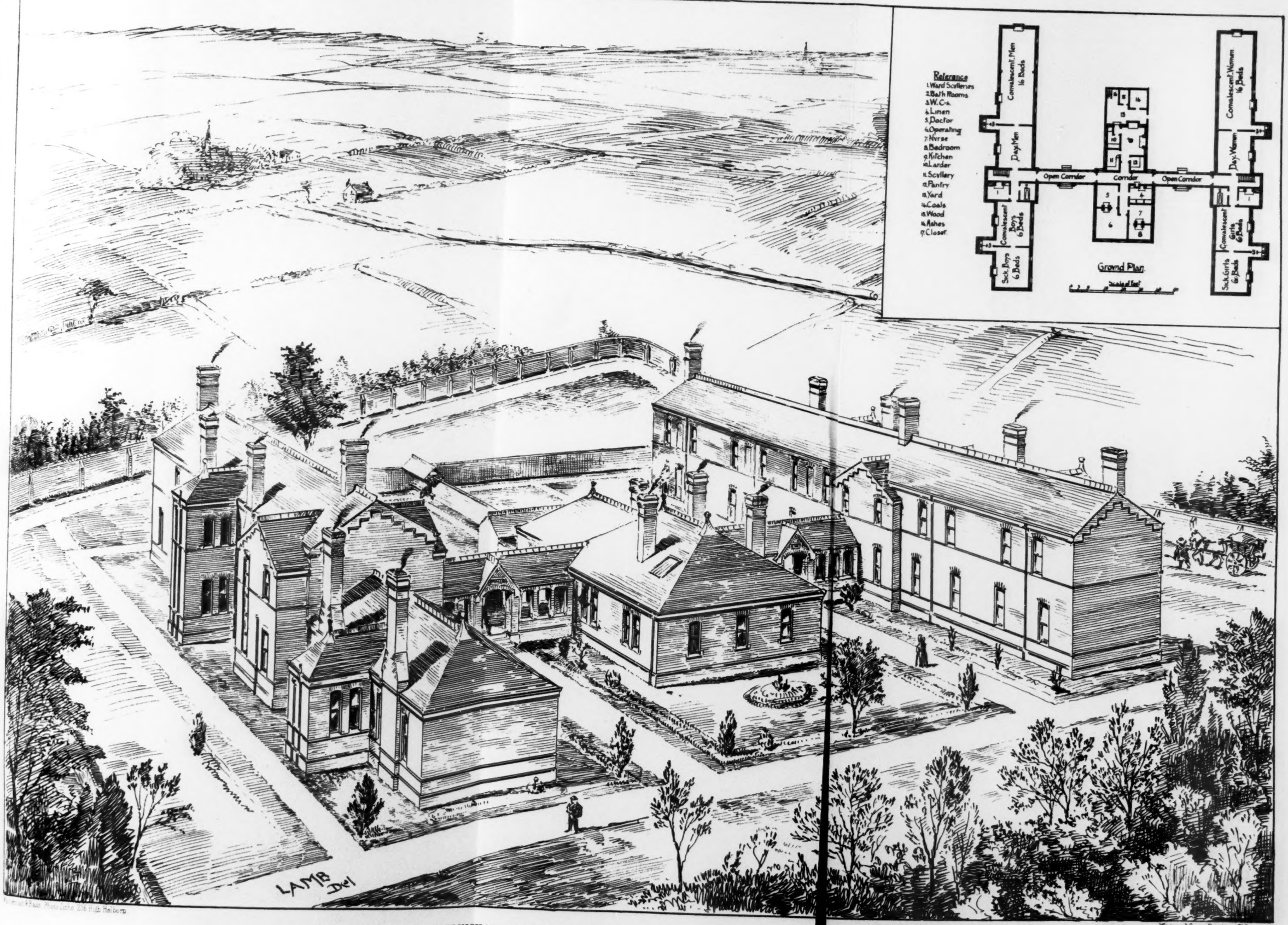

NEW INFIRMARY, ALTRINCHAM UNION, KNUTSFORD, CHESHIRE.—Messrs. Tate & Pop[illegible]plewell, Architects.

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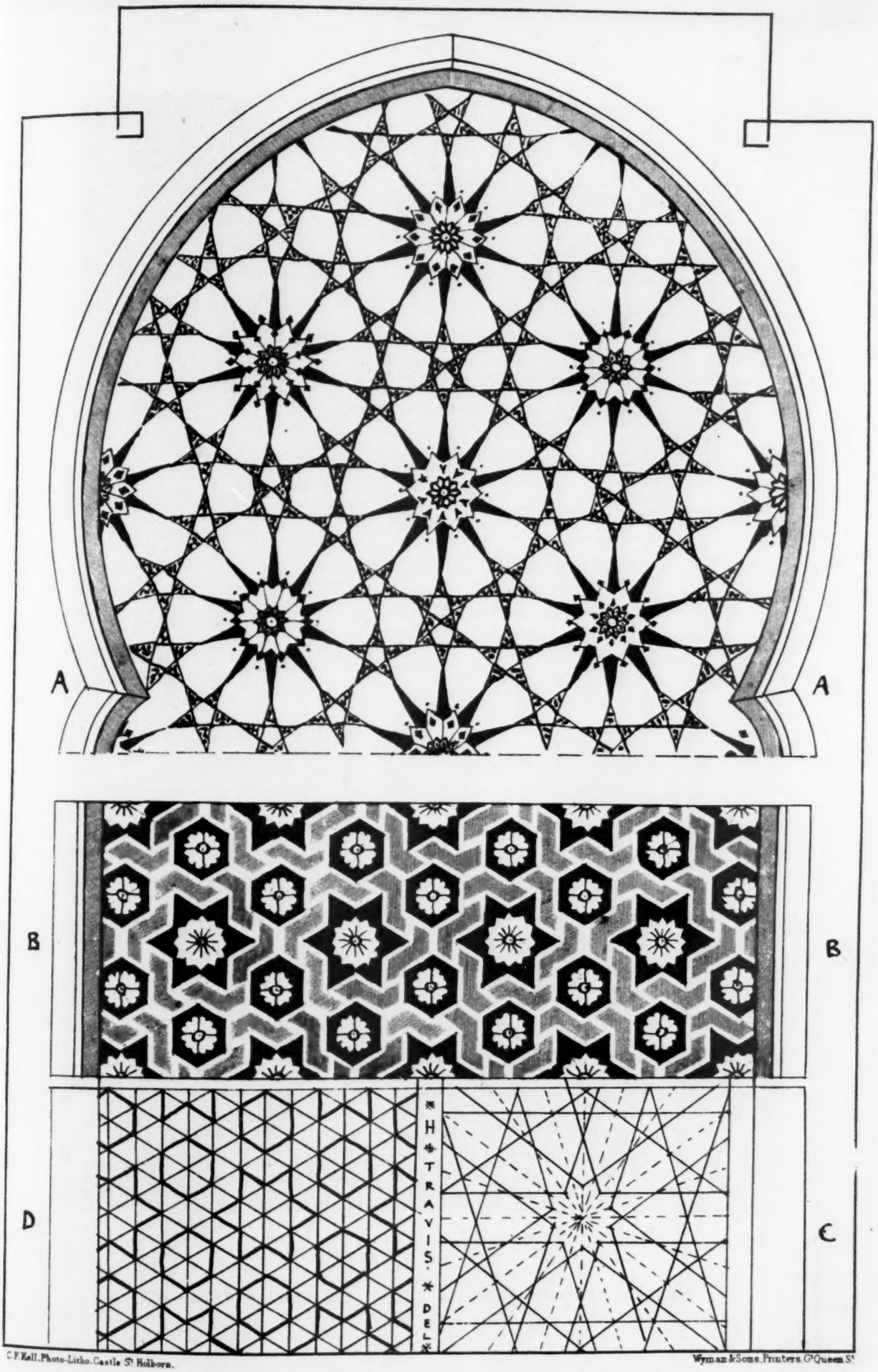

C.F.Kell, Photo-Litho. Castle St. Holborn.
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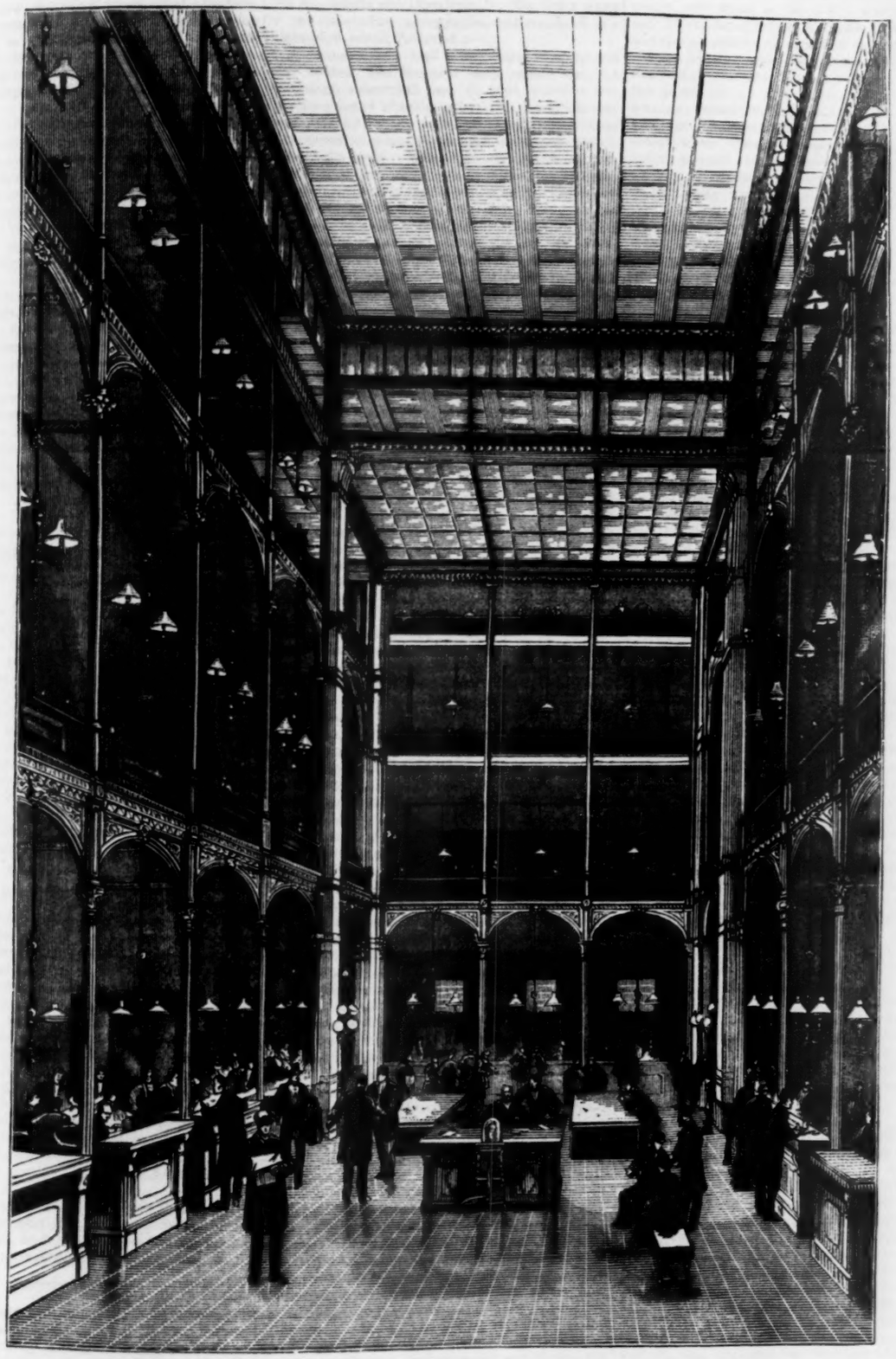
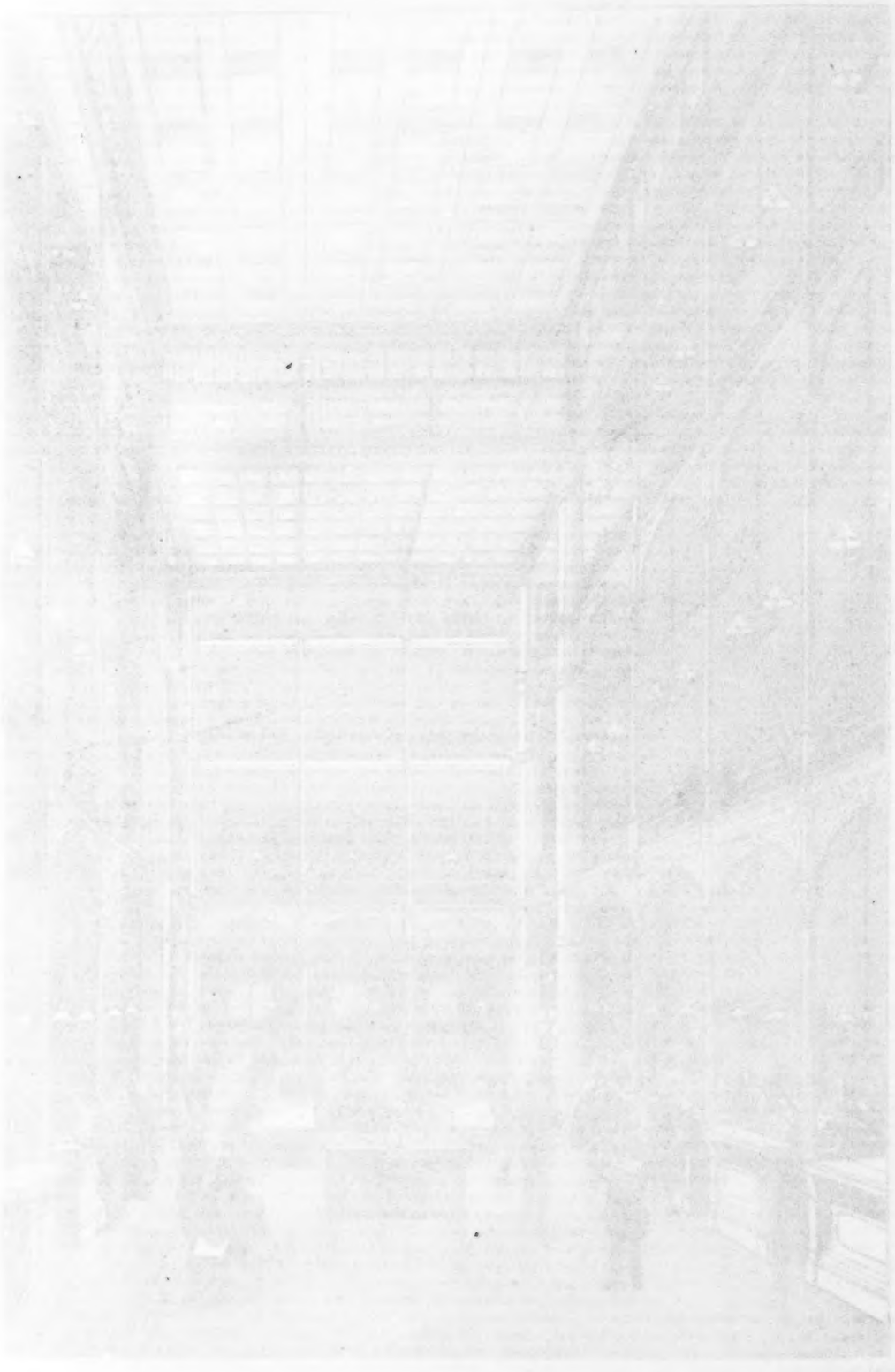
DETAILS OF MOGHUL ARCHITECTURE, AGRA, HINDOSTAN.

A—B. *Inlaid Work in Coloured Marbles on a White Ground.* C. *Geometrical of* A. D. *Geometrical of* B.



THE GREAT HALL IN THE "HÔTEL DU CRÉDIT DE FRANCE," PARIS.



THE NEW "HÔTEL DU CRÉDIT DE FRANCE," PARIS.

THE institution known as the "Crédit de France," originally established at No. 17, Rue de Londres, has outgrown its original quarters, and a handsome building has been erected for it at No. 16, in the same street. It has been erected from the designs of M. Revel, architect, in the style of the Renaissance, and we illustrate both the exterior and interior in our present number.

The flight of steps from the street leads to a spacious vestibule agreeably decorated, from which the large hall shown by one of our engravings is entered. In this three ranges of galleries, one above another, are formed by iron columns and girders.

The hall is devoted chiefly to the financiers, who are in constant communication with the public, banking business, payment of coupons, and so forth. The first floor, which is reached by a wide stone staircase, with wrought-iron railing, contains, besides a large ante-chamber, an apartment for the administrative council, and rooms for the president, director, and secretaries. The council-room is treated in the style of Louis XVI., and has a very handsome ceiling by Messrs. Gervex & Rey.

The basement, which is deeply excavated, includes some important apartments.

The precautions against fire are such that one turn of a key, we are told, suffices to inundate a considerable portion of the building.

SCHOOLS FOR ORPHANS OF FOREIGNERS, GLASGOW.

THESE schools will be supported by the subscriptions of a number of gentlemen, who have appointed the Rev. H. Stolssohn preceptor and director. They will accommodate 100 boys and 75 girls. The two schoolrooms are placed one at each end of a large dining-room. Two class-rooms are provided to each school. The first floor is equally divided for the dormitories for each sex, with lavatories, bath-rooms, linen-rooms, &c. Great attention has been paid to the proper ventilation of the building. It is proposed eventually to erect a chapel and residence for master and matron as near as may be practicable. The cost of the schools will be about 6,500*l.*, about half only of which is at present in hand. The architect is Mr. James A. Burton, of Lancaster.

THE MOGHUL BUILDINGS AT AGRA.

THE mausoleum of Prince Etmah-Doulah, from which we give some ornamental details in our present number, is built of the purest white marble, and stands in the midst of a beautiful garden, planted with cypress and other noble trees, and laid out with formal walks, fountains giving a delicious coolness to the air. Most of the decorations of this building, as well as the adjacent Taj, with its minarets and gleaming white dome topped with gold, the Summan Boorj, and the Khasa-Mehal, are of inlaid coloured marbles and precious stones, brought from all parts of India, Persia, Arabia, and Ceylon. The designs are sometimes geometrical as here shown, and sometimes elaborately floral. Some further particulars will be found in our issue for Dec. 31, 1881.

These monuments are carefully looked after by the Government of the North-Western Provinces of India, and are well worth illustration in chromo-lithography.

Tithebarn-street Station, Liverpool.—The *Bootle Times* states that the Lancashire and Yorkshire Railway Company have, at the last moment, resolved to abandon all previous projects for the extension of the Tithebarn-street Station at its present distressingly high level, and have taken into consideration the welcome alternative of constructing a totally new station on the level of Tithebarn-street. This they are advised by their consulting engineer, Sir John Hawkshaw, is perfectly feasible, and it is stated by the originator of the proposition, who is an engineer in this neighbourhood, that a very large saving in cost will be effected by thus placing the new station on the ground-level, as may be readily appreciated by any one who is familiar with the colossal system of vaulting under the present station, which was to have been reproduced in the new one.

THE AIR WITHIN OUR HOUSES.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

AT the last meeting of this society, Professor Kerr delivered an address on the "Condition of the Air within our Dwellings." We print some of the concluding paragraphs, and a note of the discussion which followed:—

A circumstance had lately been brought out and traced, the lecturer said, which was, he confessed, somewhat new to him, and that was the question of vitality in bad air. To speak non-scientifically for the moment, beneficent Nature was never at a loss to create machinery which gained its ends. When we succeeded in producing the most abominable atmosphere in any room, continually and perpetually, which we could devise, Nature stepped in, and, in her quiet, silent way, applied a remedy, all her own, to this detestable condition of things. In work-rooms in London and elsewhere, where the air was polluted in the worst form from the causes which he had mentioned, and also by the changes connected with the processes of manufacture which went on,—and some of which changes were extremely formidable with respect to the pollution of the air-bath,—when the air had been brought into the worst possible condition, then Nature set up a compensating condition, and human life became adapted to it; and it seemed that human creatures who worked in those work-rooms had their vitality accommodated to the atmosphere. They did not die; they lived on to old age, but they lived on at a very low ebb of vitality. They did a minimum of work; their functions, generally, in such cases being mere routine and mechanical action. There was nothing which involved the need of intelligence, and, consequently, they carried themselves on in a dull, droning, wretched, miserable way, until they disappeared of sheer inanition, but not until after a long life. This was an instance of the way in which Nature accommodated herself. When they went into a work-room where the air was constantly renewed, or when they went into the open fields, where men were working in the air which Nature breathed with its own freshness, then they would find the maximum of vitality, and a large quantity of food consumed, as compared with a small quantity of food consumed in the other case, and the muscular action of the system at its best, and a large amount of work done as compared with a minimum of work done in vitiated air. This has been illustrated by two very remarkable instances which he had seen quoted, and which he would mention presently; but the question before them now which was to be illustrated was this, — that in the work-room in which the air was abominable there is no cleansing done, and the air-bath was polluted, and charged with pollution upon pollution, and no cleansing took place, but in the open air the air was constantly changed, and also in well-ventilated workshops. It was a question not merely between what people called fresh air and foul air, but what we recognised as cleansing *versus* non-cleansing. Here was the illustration to which he referred. In a certain work-room, occupied by a certain number of young women engaged in needlework, there was a very bad condition of ventilation indeed, and some kind scientific gentleman designed a simple process of ventilation, and the girls became lively, instead of being dull and stupid; and they struck for an increase of wages, not on account of increased intelligence, but because they said they could not live upon the old wages, as their appetites increased. Whether the lady at the head of the establishment shut up the ventilator again he did not know. In the other case, a certain barrack-room was described as being badly ventilated, and science stepped in again as a Good Samaritan, and introduced good ventilation. The soldiers did not stop up the ventilators, and they did not strike for more wages, but they struck for more food; their appetites increased, and their intelligence, and, no doubt, their activity, increased. The question had to be brought before the War Office, in the time of Lord Herbert of Lea. They would see perfectly well the application of these illustrations and the science which was involved. One more matter which he might mention was the question of actual disease in the sense of a disturbance of the bodily organs, to be treated medically, produced by want of cleansing of the air. They would not talk any more about foul or impure air, or pure and fresh air; but they would talk about an air-bath which was cleansed, as against one which was not cleansed. They had all heard that in polluted air various forms of disease would come into existence; according to the old-fashioned formula, disease was said to be brought about by the medium of bad air. They all remembered the instance of Dr. Abernethy, who when he went into a sick-chamber, and found the chimney blocked up with a sack and the air otherwise carefully excluded, pushed his fist through the window in order to let in the beneficent air. We all now acknowledged the power of air and light, and doctors nowadays removed their patients to fresh air. They removed their patient from some back slum (of which there were too many in London and all large towns), to hospitals where there was plenty of space, and where ventilation was scientifically conducted. They all knew what was the cause of dry rot. He need not talk to them about it as a fungus upon the surface of wood. Where there was, under a floor or elsewhere, the presence of a great deal of moisture, with a certain amount of heat, this fungus grew rapidly. They also knew the cure. Let in the air, by putting in two or three air-bricks, and they drove dry rot out. So it was with disease. Dry rot might be said to be in the lungs or liver, simply by reason of the polluted air. In the fresh air this dry-rot would disappear. This was about the condition of things with respect to ventilation. They would ask, "How is this to be remedied?" He was not going to say; he left it to engineers to discover that. Speaking seriously, he thought they would agree with him that ventilation was still in its infancy, and that the problem of how to ventilate English rooms in English houses had not yet been fairly attacked. There were plenty of nostrums and patents, but there was nothing by which the air-bath of an ordinary room could be kept even reasonably pure. If there were, he should be happy to hear it described. It was of no use in these days to propose the use of anything which was complicated. If they had anything to propose with respect to ventilation, let it be simple. The more complicated it was, and the more ingenious it was, they might depend upon it the more pestiferous it would turn out. Let them consider how simply Nature did her work. They all knew what the air was, and what was its composition, and how it did its work with a simplicity which was perfectly alarming; and when he contrasted it with our perverted contrivances, he asked, was it not perfectly plain that in the solution of this great question of ventilation, simplicity must be considered, and complication avoided? The question was simply this, and this was the plainest and most scientific way of putting it. They had a reservoir of air in the interior of their rooms, and that must be kept in the fresh condition of the air in the open fields. He would not accept anything else. He did not say they could solve the problem; he did not say that it would be solved in his lifetime or the lifetime of his children; but it must be solved sooner or later, otherwise we must go on with our vital energies impaired, generation after generation, and civilisation be regarded more as an influence for the deterioration of the human system than for its improvement.

At the close of the lecture,

The President (Mr. Walmisley, C.E.) said he was sure they would all feel deeply indebted to Professor Kerr for his kindness in addressing them upon a subject which was of vital importance, and which demanded our best attention and the best scientific arrangements possible. There was no doubt our system of house drainage was capable of very great improvement. As regarded the admission of fresh air, and the getting out of foul air, he believed that in the British Museum reading-room there was an arrangement for regulating the temperature of the air before it was admitted into the room, and the foul air ascended through holes in the upper part of the room. No doubt there was a good deal in that, but they did not want to have a draught.

Professor Corfield said that Professor Kerr had challenged them to show how ventilation could be practically accomplished. He did not think it would ever be accomplished to the extent demanded by Professor Kerr. Unless they had two sides of a room open he did not see how a room which was inhabited could ever have the air in it in the same condition as the pure exterior air. But we could do something, and what had been done was this: we could reduce the amount of impurity in the air in our rooms to such an extent that its presence was not felt by

any one coming into our rooms, and that condition was well known to chemists. The amount of impurity in the air of rooms could be estimated by the percentage of carbonic acid in the air. But that had nothing to do with the idea of the air being unwholesome, for the amount of carbonic acid was never so great as to be of importance to the phenomenon of respiration. It had been ascertained accurately, that when the carbonic acid in a room exceeded that in the outer air by two parts in 10,000 (the carbonic acid in the outer air being four parts in 10,000), then the other impurities made the air unfit to breathe unless we changed the atmosphere. There was no doubt that limit of purity could be reached by various methods, not by nostrums, as the Professor had referred to, but by plans of ventilation. In a certain barrack-room warm air had been introduced, and an upward direction given to its current, by which means, and without any draught, the air had been brought, he would not say to the standard of purity which he should like, but it had been brought down to about one-fourth of the impurities it originally contained. A great deal had been achieved towards the solution of the problem of ventilation without the aid of any nostrums. With respect to the beneficence of Nature, both as regarded architectural and medical subjects, he was disposed to agree with what Professor Kerr had said to this extent, that if they put themselves in a condition in which Nature could be beneficent she would be beneficent; but the instant they put themselves in a condition in which they were opposed to Nature, to any extent whatever, then Nature was maleficent to the highest degree. Take the case of a hospital where there has once been hospital gangrene; in many cases it could never be got out of hospitals without taking the buildings down. He gave one or two other illustrations which he contended went to prove that Nature is only beneficent so long as we find ourselves in circumstances which are advantageous to us.

Mr. E. C. Robins said that Professor Kerr had not left them much room for criticism. The Professor had told them facts which, no doubt, the generality of those present were well aware of; but the Professor had not shown them how to get out of the difficulty with respect to ventilation. Some of them knew that the problems were not insoluble, and some had been solved. Amongst other means, there was what was called Watson's ventilator, which was very suitable in deep basements, in stables, and many other places. Then there was what was called Tobin's system. He believed it was difficult to get the upward cast of the air, which had been alluded to, unless they had an upward shaft. He referred to the fact that stoves have been introduced which provide for a certain amount of ventilation.

Mr. H. H. Collins said he had come to the conclusion that the proper way to ventilate a room was to warm the atmosphere before it was allowed to enter the room. He mentioned Wake's hydrostatic calorific stove, where the water was made to circulate through a tube, and an upward current was given to the warm air on entering the room. Of course this system involved the introduction into a house of hot-water apparatus. He hoped they would not soon arrive at the period when the walls would be made so porous that the air rushed in. As regarded manure in the open air being so innocuous as the Professor had stated, he was inclined to take a somewhat different view; and he mentioned a case in which a lady, who had been residing at one of the bungalows near Westgate-on-Sea, was laid up with a severe illness, and, upon an investigation into the cause being made, it was found that the fields around were manured with seaweed. With regard to the soil on which houses were built, the Metropolitan Board of Works had recognised the necessity of controlling this matter, and required that the whole surface of the ground on which a house was to be built should be covered with 6 in. of concrete.

Mr. R. E. Middleton said he thought the best results which had been attained by ventilation had been brought about by the use of warm air. But they wanted health in the houses of the poor as well as the rich,—in fact, they wanted more ventilation in the houses of the poor, and it would be impossible to provide hot-water apparatus in poor houses. No doubt, our fires were not healthy, but they certainly were not so inimical to health as the stoves used in America and Germany. He agreed that in ventilation it was necessary to have a good upward current of air. There were many simple contrivances which would provide fairly good ventilation. As to drainage, as at present carried out, one great object of engineers was to have a perpetual current of air through the drains, and there was no reason why this should cost a large additional amount.

Mr. B. Haughton said he was inclined to agree with Professor Kerr that ventilation had made no extension during the last thirty years. He discussed it thirty years ago from an engineer's point of view, and then the universal idea was that there could be no such thing as ventilation in the simple way the Professor demanded. They must have a heated current of air to ventilate a room properly; but, if they had a heated current of air, why not dispense with a fire in the room, and heat the room at the same time they ventilated it? With regard to stables, an excellent plan to sweeten them was to use saw dust, which annihilated the injurious matter. It was not necessary to use sawdust as litter, but a small quantity scattered about the stables would be sufficient.

Mr. Wm. C. Street said that whilst Professor Kerr had been calling the engineers to account, he might have called to account the architects. For his own part, he did not think the problem to be solved was so difficult, were it not for the people they had to deal with. In small dwellings it would generally be found that the ventilators were kept closed, because people fancied there were draughts. He thought the simplest plan of ventilation was the best; and he had not found anything to beat a small valve near the ceiling which, to all intents and purposes, kept the air pure. It seemed to him that if they heated the building with warm water, they would just heat the stagnant air-bath to which the Professor had alluded. As regarded the ground-air, that was not a very difficult thing to deal with in London. In deep basements, if they put around a coating of asphalte it was sufficient to keep out air and water, and render the building free from ground-air and damp.

Mr. H. T. Munday said he thought the problem of ventilation would never be solved to the extent demanded by Professor Kerr, because it might be taken as an axiom that the air within our rooms could never be so pure as the air outside, which was the only thing which Professor Kerr would accept. He could not quite agree with what the Professor had said about nostrums which engineers had introduced to meet the requirements of drainage; whilst we lived as we did we must have some "nostrums," or some contrivances, to overcome the conditions of life under which we have placed ourselves. He thought the only means of dealing with sewage was by water carriage, at the same time putting in as many ventilators as possible on the line of the channels. As regarded this question of drainage, if the engineer had taken the matter out of the hands of the architect it was because the architect had not attempted to deal with it.

Dr. English said he thought that for good ventilation the window ventilation, with an escape for the foul air in the ceiling, seemed all that was necessary.

Professor Kerr, in the course of a brief reference to some of the comments which had been made, said that when he mentioned the word "nostrums" he did not, for a moment, mean to speak disrespectfully, but what he had said was borne out by what had been stated about complicated arrangements and apparatus, and the difference of opinion which existed in respect to the matter. As regarded the test of carbonic acid, he contended it was not a fair test of the impurity of the air in the conditions under which we lived, and he thought scientific men should turn their attention to other tests as to the purity or impurity of the atmosphere. As regarded porous walls, what he said on that subject was merely a suggestion in the abstract, and he guarded himself against advocating it practically. He could not recede from his position in demanding that engineers should challenge criticism on this matter of ventilation. As regarded drainage, he would not venture to propose open drains for London, but the more the drains were ventilated the better.

An Exhibition destroyed by Fire.—Dr. Jannasch, of Berlin, has received a telegram from Port Allegre in Brazil, announcing that the Exhibition recently opened there has been totally destroyed by fire.

ON THE SCIENCE OF PROPORTION IN RELATION TO ARCHITECTURE.

THIS was the title of a lecture by Mr. W. Cave Thomas, read before "The Society for the Fine Arts," at their rooms in Conduit-street, on the 9th inst., Mr. G. Godwin in the chair. The lecturer began by urging that the entire visible world consists in proportion, and that the great constructive principle of Nature is adaptation to purpose. But as all things consist in proportions, the principle of adaptation to purpose resolves itself into that of adaptation of proportion to purpose. Those who could not mentally grasp the doctrine of proportion in this, its entirety, would, nevertheless, be prepared to admit that architecture inheres in proportional relation. The lecturer, therefore, for the time being, confined himself to the elucidation of that section of the science of proportion which relates to architecture.

The science of proportion does not deal with absolute but relative magnitudes. It cannot be affirmed that any one dimension is more beautiful than another, but we are competent to pronounce whether anything consisting in the ratio or magnitudes of 1 : 2 is more agreeable to sense than an instance of the same kind inhering in the ratio of 1 : 9. The consideration of the science of proportion, therefore, resolves itself into the consideration of the characteristics of ratios. Now, the infinitude of ratios are the numerical expressions for all the possible relations in which two quantities may be to each other. Mr. Thomas demonstrated many years since, and in these pages, that the limits of ratios may be expressed as 1 : 1 and 0 : 1, and that between these extremes of equality and disparity all other ratios lie. These limits, then, place the entire scale of ratios within the range of our mental inspection and grasp; we may study it, analyse it, and reason upon it. In the accompanying scale, the Calculus of Ratios, as the lecturer terms it, it is divided into twenty-fourths, but it may be divided into any number of degrees at will. Every ratio has its immutable position in the scale.

Calculus of Ratio.

24 : 24 :: 1 : 1	1
23 : 24 :: 1 : 1 1/23	Ratios of extreme Approximation or Equality.
22 : 24 :: 1 : 1 1/11	
21 : 24 :: 1 : 1 1/7	
20 : 24 :: 1 : 1 1/5	
19 : 24 :: 1 : 1 1/19	
18 : 24 :: 1 : 1 1/3	
17 : 24 :: 1 : 1 1/17	
16 : 24 :: 1 : 1 1/2	1/2
15 : 24 :: 1 : 1 2/3	Octave of Mean or Moderate Ratios.
14 : 24 :: 1 : 1 3/4	
13 : 24 :: 1 : 1 4/5	
12 : 24 :: 1 : 2	
11 : 24 :: 1 : 2 2/11	
10 : 24 :: 1 : 2 2/5	
9 : 24 :: 1 : 2 2/3	
8 : 24 :: 1 : 3	
7 : 24 :: 1 : 3 3/7	1/2
6 : 24 :: 1 : 4	Ratios of extreme Difference.
5 : 24 :: 1 : 4 4/5	
4 : 24 :: 1 : 6	
3 : 24 :: 1 : 8	
2 : 24 :: 1 : 12	
1 : 24 :: 1 : 24	
0 : 24 / 24 :: 0 : 1	0

The simplest division of the scale is into two equal parts, and the next in simplicity is into three. The lecturer chose the latter, because it is conformable to the division of cosmical phenomena into excessive, mean or moderate, and defective, manifestations; because it yields a central zone or compass of moderate ratios, flanked by two zones of extreme ratios, each compass or zone being equal to a third of the entire scale. This tripartite division was probably adopted by the ancients. It yields, as it were, a torrid, a temperate, and a frigid zone of ratios. The scale as it stands, without any such general division, has no significance; it is merely a table of ratios.

The lecturer then proceeded to inquire whether there was any evidence in human experience which would induce a preference for any set of ratios in the scale thus divided into three equal zones? He demonstrated that there was none in favour of the ratios contained in the two extreme zones of the scale, but that there was overwhelming testimony in favour of those comprised within the middle third, those lying within the limits of 1 : 3 and 2 : 3,—those lying within the compass or zone of moderation.

He then drew attention to the doctrine of the *mean*, which is, in its general sense, one of our most ancient and best attested scientific and mental possessions. Volumes might be filled

with testimonies to its truth. The principle of the mean, in virtue of its importance and universal applicability, has been rightly entitled the Golden and the Immutable. There are very few persons, however, who, when they exhort others to observe the mean, or medium, in all things, are in the slightest degree conscious that they are using a mathematical expression for rectitude,—for the Good and the Beautiful.

A number of facts were then marshalled as testimonies in favour of the doctrine of the mean, being the mathematical doctrine of the proportions of well-being and of excellence in nature and in art. There could be little doubt that the Greeks had worked out this doctrine in its entirety. The mean was the central and immutable principle of that science of proportion which underlies all the harmonies of nature, of that science which the lecturer had set himself to recover and to place on its ancient pedestal. Aristotle had applied this mathematical principle to ethics; and if the Greeks applied it to ethics, we may be certain that they must have known that it was applicable to art. Dryden, Hogarth, the Père Bouffier, and Sir Joshua Reynolds had all discerned, in a hazy way, that the doctrine was applicable to art; Dryden even said that "there was a *mean* and a *certain* measure in which the good and the beautiful consist, and out of which they never can depart."

Mr. Thomas then entered upon a more minute analysis of the compass of mean or moderate ratios, and in doing so mentioned what he believed had never been noticed before, a remarkable point of contact between formative and musical art, viz, that the central zone of moderate ratios was comprised within the compass of an octave, or within the ratios of 1 : 3 and 2 : 3, which are to each other in the ratio of two contiguous octaves or that of 1 : 2. The compass of an octave, it would be discerned, occupied precisely the middle zone of the infinity of ratios; this was doubtless the reason why it had been adopted as the unit of the musical scale. In this zone of ratios lay those in which he might almost say the harmony of the universe consists. He also pointed out that 1 : 2 is the mean of the infinity of ratios; it was, therefore, to be regarded as the most excellent and beautiful ratio. These important facts, from their scientific accuracy, render us altogether independent of ancient practice.

Art, like Nature, when rightly directed, tried to steer a middle course between extremes. The two extremes of ratio were equality and greatest difference (1 : 1 and 0 : 1). Art, therefore, avoided the regular geometrical figures, because these contained too great an amount of equality, and also, for an opposite reason, the eccentricity of the extremely elliptical figures, whose ratios were of too wide disparity. Even the moderately elliptical figures possessed too great an amount of regularity for a refined taste. There was, however, another order of figures, having *contrariety* in their proportions, viz, the oviforms, or egg shapes. These in their mean proportions had ever been regarded as the very symbols of good taste. This was the reason why the vase became so important an art object amongst the Greeks; the abstract science of proportion might be rigorously applied to their construction. The oviforms were of two kinds,—the upright vase forms and the oblate bowl forms. These forms might be described mechanically from three foci. If the complementary forms of the two species were brought into juxtaposition, they became the foils or contrasts to each other. The proportions of the complementary forms depended upon precisely the same principle as the complementary colours. Mr. Thomas gave the rule for finding the complementary of any ratio. The application of the science of proportion to the oviforms linked them with architecture; for in the oviforms there were two main divisions, which might be differentiated *inter se, ad infinitum*, just as the proportions of a pediment might be differentiated with reference to the columnar portion of the portico. Three diagrams of Grecian porticos were given, which were founded upon the ratios of the three moderately-proportioned oviforms, on the ratios 1 : 3, 1 : 2, and 2 : 3 :: 1 : 1½, and which, by the *necessary* conditions of their evolation from these ratios, produced the hexastyle, octostyle, and decastyle columniations, with perfectly consistent proportional features. It should be recollected that 1 : 3 and 1 : 1½ were, at the same time that they were the limits of the compass of moderation, also the first terms of the two extremes. The ratios 1 : 1½ and 1 : 2½ might, therefore, be esteemed as the limits of the most excellent and beautiful proportions. But whether the oviforms were adopted as keys or not, the calculus of ratio left us free to apply moderate proportions without any such restraints.

It was a fallacy to suppose that the sole end of art, any more than that of nature, was the presentment of the beautiful. The grand consisted in proportional characteristics quite distinct from those of the beautiful. There was a complete muddle in many minds in respect to art questions: with such persons all the different art aims were confounded under the heading of "The Beautiful." A great many art failures were due to men's inability to divide the truth rightly. They, therefore, vainly endeavoured to reconcile incompatible aims.

Mr. Cave Thomas said his lecture might appear bold when considered with reference to the variety of proportions which were possible in nature and in art, but he reminded his audience that whatever visible variety was possible in nature was due to the endless permutations and combinations of the ratios which might be conceived as lying within the limits of 1 : 1 and 0 : 1, of that scale which he had symbolised in the diagram. At all events, he had, by a rigorous process of reasoning, demonstrated that in architecture, as in everything else, the principle of moderation was the safest and the best, and not only this, but that the compass of moderate proportions was the compass of the beautiful.

ENGLISH PARISH CHURCHES.

AT the Kensington Vestry-hall, on the 9th inst., Mr. J. T. Micklethwaite, F.S.A., delivered an interesting lecture on "English Parish Churches," to a crowded audience, principally composed of ladies. The lecture was one of a series given in support of the Society for the Protection of Ancient Buildings. The chair was taken by Mr. Reginald Stuart Poole, of the British Museum.

Mr. Micklethwaite said that he had come there that day partly to describe the history of their old parish churches, and partly to plead their cause. He claimed for them that they were the most interesting relics of all antiquities that they had, more so than pre-historic antiquities like Stonehenge, which they simply had as a dead relic. Churches, on the other hand, were still what they were from the beginning,—places where people went for worship and where they had attended for hundreds of years. They were, he considered, even more interesting than cathedral and abbey churches, because they were more especially the outcome of the people, and, unlike cathedral and abbey churches, they frequently were small but rich corporations. They were actually older in traditions than cathedrals or abbey churches, the history of which, as they knew, was comparatively of a recent date. Many of the cathedrals dated from the eleventh or twelfth century, but the introduction of Christianity, as it was called, dated from the beginning of the sixth century. When Augustine and his monks came from Rome on a mission to this country, Christianity had been known here before. The bishops he brought with him were nearly all monks; they were either foreigners, or had been educated by foreigners: consequently they took their ideas from Italian sources, which Augustine and his companions introduced. The churches which Augustine founded at Canterbury had a distinct type about them, they being basilican in their plan. At Brixworth, too, he founded a church in 680; it was not a church of the first class, but of the second. Another was built at Dover about that time, which was quite different from the ordinary parish churches.

At the time of the withdrawal of the Romans, all the more civilised Britons were Christians, as Britain was a Christian country, and, although it had been denied, yet he (the lecturer) believed that the Christians were then in a majority. As to the sort of churches they used, in this country they had nothing to date from before coming to the Saxons but the Irish Church, which was a very close connexion indeed. In Ireland the people, long after the English had settled down, began to build churches, which were very peculiar in their way, and quite different from the Italian tradition, and they might fairly assume that these churches, if not actually contemporary with British churches, closely resembled them, and came from the same source. When the Saxons began to build churches for their own use, those churches consisted of a small square, a narrow arch very little more than a door, and a small undivided nave without any aisles. A comparison of the buildings led one not less to doubt that their parish churches were not derived from the Italian traditions, but from the ancient British. There was another matter,—the ancient date of the division into parishes,—which showed the extreme antiquity of the parish church plans. There was absolutely no record to be found of the division of the parishes. Until the eighteenth century such a thing as an absolutely new parish church was very rare indeed. The sites might possibly be older even than Christianity. When Canute became a Christian they were not told that he built churches, but that he rebuilt those which he and his father had previously destroyed, and he (the lecturer) believed that many Saxon churches which had come down to them belonged to that rebuilding.

As the parishes got larger and there were more people, the churches were not found big enough, and apparently, about the beginning of the eleventh century, there was built a mixed type of church. At that time transepts had come in, and a fresh start was made. Nearly every church in the land was more or less rebuilt, some of them entirely so, and a new tradition was introduced; but the parish churches kept their old traditions, and did not alter their plans. The lecturer then proceeded to refer to the parish church in his native town, Wakefield, which, he said, had gone through a number of changes, it being from time to time enlarged. He described in detail the number of changes which had been introduced into it, and stated that in the end it was completely remodelled. There were pieces, he said, to be traced of every stage of the changes which it had undergone. What had happened at Wakefield parish church had occurred more or less to every parish church in the land; in fact, he might say that this had been done in nine cases out of ten.

In regard to the fittings of Celtic churches, they were arranged not for choruses, but for masses; there was gradually growing up the custom not for regular, but for occasional choral services, which caused the parish churches to imitate other churches: consequently, elements were drawn from the abbeys and cathedrals. One of the elements introduced was the elongation of the chancels, and the number of the clergy was increased. At funerals choirs were engaged, and many of the singers made a living in that way, this fact causing increased improvements to be made to the chancel. In the fifteenth century, in many of the parish churches choral service was introduced. The stalls in the parish churches were just exactly the same as in cathedrals, but in the parish churches there was only one row, while in the cathedrals there were three rows. Then odd alterations were stuck everywhere, because at the end of the thirteenth century the custom of chantries came in, services being held for the benefit of certain deceased people, some families having performed perpetual chantry. He was sorry to say that a great many chantries had been destroyed during the last few years. They were surrounded by a little chapel, which served a double purpose. The people who founded the little chapel were in the habit of using it as their private pew, and that arrangement affected the form of the chantry, it being entirely for their accommodation. In some instances chantries, or something very like them, had belonged to guilds, and occasionally an arrangement was made for the whole of the guild to be present. At a parish near Oxford one trade guild had the government of the town in its hands, and it had a very large chantry at the church. Up to the seventeenth century sermons were not the ordinary thing in parish churches, consequently there was no need of pulpits. The more ordinary custom was for the preaching to take place out of doors, so that the large congregations might hear. In respect to images and lights, they were subjects of interest. An image would be private, and kept up by a guild simply as a bond of union, a light being burnt in front of the image. Guilds were a very essential part of the parish churches, and by their influence funds were raised.

They now came to a great change in parish churches, viz, that which was brought about at the era of the Reformation. It did not, however, affect parish churches immediately, and very little alteration was made in them; but in the time of Edward VI.

the government got into the hands of a set of extraordinary adventurers, who amused themselves by scrambling for what they could get. All through history at that time it was one of plunder, but not so much mischief was done on religious grounds, the principal thing being plunder. Altogether, however, the churches then suffered very much indeed. The time of Queen Mary did not make much difference in this respect. In Queen Elizabeth's reign matters improved, there being not so much plundering, and an entire change subsequently took place on the part of those who had the management of the churches. Puritan feeling became strong, and the taste for sermons grew up. Matters became a little more settled about the year 1620, when there was a strong revival of church building. Then came the Civil Wars, and the Puritan supremacy in churches was altered. Architecturally, nothing was gained, but a great deal was lost. At the Restoration, too, nothing much was gained. Of course, there was a great deal of preaching, and this brought about the introduction of galleries into churches, they being by no means bad things. Some of the churches (especially one at Halifax) were wonderfully fitted up with galleries at the early part of the seventeenth century, at which time they found the elements of new churches being built. With the Great Fire of London there was brought about a great change. Sir Christopher Wren carried out an entirely new system of church building. Then came the Georgian style, which existed until the first half of the present century, when there came in a strong movement for the studying of old churches and of imitating them, this being followed by another movement having the object of putting churches back to their old condition. He wished to guard himself as to what he might say in respect to the practice of restoration, but in what they did they should not hinder the history of the church. Even the old pews, like tanks, of the Georgian period should not be removed without caution being exercised. Their parish churches had passed through times both good and evil. He pleaded their cause, though many, he was sorry to say, had been destroyed, but, as in the old story, those that remained were still of the same value as of old, not because they were worthless, but because they were priceless.

THE PEDIMENT SCULPTURES OF ÆGINA.

EDINBURGH ARCHITECTURAL ASSOCIATION.

A LECTURE on "The Pediment Sculptures of Ægina and their Composition" was delivered on the 8th inst., by Professor Baldwin Brown, to the members of the Edinburgh Architectural Association. Mr. John M'Lachlan, the president of the Association, occupied the chair. In the course of his lecture Professor Baldwin Brown pointed out that the works under discussion were discovered among the ruins of the temple dedicated to the goddess Athene, which was demolished by an earthquake. The discovery was made by a party of explorers in the year 1811. The fragments were carefully collected, and when they were subjected to close examination it was found that five figures of the eastern pediment could be totally restored, and ten of the western pediment. The work of placing the fragments together was entrusted to Martin Vagna, who satisfactorily performed at Rome the duty confided to him. The figures were also executed in models of nearly life-size, and these were at present in the Museum of Munich. Professor Baldwin Brown then described the western pediment, an excellent model of which he exhibited. The height of the pediment, according to Cockerell, he stated, was 5 ft. 6 in., inside measurement; the whole length, from corner to corner, was 41 ft.; the depth was 2 ft. 3 in.; and from the topmost step of the platform, on which the temple stood, an elevation of 23 ft. was reached. Regarding the figures represented on the pediment, they were supposed to exhibit a contest for the body of Achilles. In the middle, as if guarding the fallen hero, stood the goddess Athene. On each side were prominent heroes of the Greeks, acting as spearmen and warriors, while at each end of the pediment lay a wounded warrior. These statues, the lecturer said, were amongst the most interesting of the works of ancient art which were left to us. They belonged to the period shortly before the outburst of the artistic activity of the Greeks, and as examples of the archaic manner no better specimens were to be found. Proceeding to speak of the dubiety which existed as to whether the figures were embellished with colouring, the lecturer showed that, on account of parts of the surface of the figures being corroded, and other portions being perfectly preserved, there was every reason to believe that the figures had borne colouring. He then alluded to the position of the statues, and pointed out the remarkable manner in which they were supported. The figures were let into small plinths, which were afterwards filled in with lead. In connexion with the manner in which the figures were supported, the lecturer, as an instance, drew attention to the position of a statue in a kneeling position. The lower limb, although nearly touching the bed of the pediment, was unsupported except at the joining of the toe with the base of the pediment, and the foremost limb was fixed into the latter, by the usual bronze joining, from the sole of the foot.

PROMOTION OF DISTRICT SURVEYORS.

ELECTIONS.

AT a meeting of the Metropolitan Board of Works, on the 10th inst., the Building Act Committee reported that, in accordance with a resolution of the Board, come to a fortnight previously (see *Builder*, p. 271, *ante*), a circular had been sent to all the district surveyors of the metropolis, inquiring if they desired to become candidates for either of the two vacant surveyorships of West Wandsworth and East Wandsworth with Tooting Graveney. Twenty-seven replies had been received, twenty-three district surveyors stating that they had no desire to change their offices, while four, viz., Mr. G. Aitchison (district surveyor of Woolwich), Mr. Rowland Plumbe (South Islington), Mr. J. B. Redman (Tower Liberty), and Mr. T. Roger Smith (St. Saviour's, Southwark, and northern part of Lambeth), offered themselves as candidates for the vacancies. The usual voluminous resolutions as to the conditions of appointment (with an extra one to the effect that the successful candidates for the vacancies should at once resign the district surveyorships they at present held) having been carried, the Board proceeded to the election, the voting being as follows:—

District of West Wandsworth.

	1st Vote.	2nd Vote.	3rd Vote.	4th Vote.
Aitchison	6*	13	7	—
Plumbe	6*	—	—	—
Redman	8	5	—	—
Smith	26	28	28	Elected.

District of East Wandsworth and Tooting Graveney.

	1st Vote.	2nd Vote.	3rd Vote.
Aitchison	23	26	Elected.
Plumbe	7	—	—
Redman	8	8	—

The promotion of Messrs. T. Roger Smith and Aitchison to these districts thus causes vacancies in the districts in which they have hitherto served.

* There being a "tie" here, it was put to the vote which of the two names should be retained, the result being that Mr. Aitchison received seventeen votes and Mr. Plumbe five.

TRADE-MARKS, ANCIENT AND MODERN.

A COUNTY-COURT JUDGE, Mr. J. T. Abdy, D.C.L., delivered an interesting lecture recently on this subject at Great Baddow, Essex, and a report of it appears in the *Chelmsford Chronicle*.

The lecturer said he had to speak of certain marks which in old times and in the present day were affixed upon articles for sale in order to mark the excellence of the goods and the respectability and standing of the person who sold them, and he proposed to give an historical account of trade-marks, and to speak of the legal regulations which had been introduced into this country for the purpose of establishing them as matters of necessity. The subject was of considerable moment as showing us a part of the history of our commercial transactions, and it was also important, because it showed that in old times certain persons had attained a celebrity in their particular line as merchants and traders, and that they claimed to make known that reputation by special signs and marks. As to the importance of the subject, the late Mr. Roebuck said in 1862, in a committee of the House of Commons, when a man had manufactured an article for which he had obtained a reputation he wished that it should be known as his manufacture, and therefore not only put his name to the article, but also affixed his sign, mark, or symbol. Before that committee a letter was read, in which a Prussian manufacturer offered to make an article of hardware with any Sheffield mark the buyer pleased, and to put the article in a wrapper precisely like that of any Sheffield manufacturer. This Prussian manufacturer made a bad article, affixed to it an English trade-mark, and put a high price upon it, and then he made a good article, affirmed it to be of his own make, put his own name upon it; and then exhibited the two together, and said, "Here you have the English article, a most inferior thing; there you have the Prussian article, a most superior one, and now you see that we can compete with the English in this particular line." The early history of trade-marks was involved in obscurity, but it appeared that the marks were in general use for about 300 years,—that was from about 1300 to 1600. The first specimens were simple in form and of a somewhat religious character, but after a time this simple and religious character was departed from, and then the marks became very complicated, almost like monograms. Their forms depended entirely upon the fancy of the merchants, there being no fixed rules for them. Of course, care was taken to avoid copying a neighbour's mark; but they were all alike in one respect,—namely, in having a precise, definite shape, and they were used by any trader of any standing in a city. Undoubtedly the marks were hereditary, and in some cases different branches of a family retained the same mark, with a slight alteration to prevent mistakes. Some had supposed that the marks were used on shields by those who had no hereditary coat of arms; but in the sixteenth century many great merchants had coats of arms, and it was not uncommon to find the trade mark and the family mark on the same escutcheon. In old times if merchants gave money towards the building or restoration of churches, their marks were placed in the windows, sometimes side by side with the coats of arms of noble squires, promoters of the same work. This was referred to in "Piers Plowman's Creed." A book of entries found at Yarmouth showed that in 1577 it was intended to borrow 1,000*l.* from the City of London, and that several of the townsmen, instead of writing their names, appended their trade-marks to the entry. The records of most corporate towns threw some light upon this subject, and showed that trade-marks were looked upon as matters of importance. On the Continent, merchants' marks were in use at a very early date, nor was their use given up until a later date than was the case in England. Masons' marks were very much like merchants' marks, and they were still to be found in English and Continental churches. They were put upon the stones, not for the purpose of showing in what order the stones were to come, but to show who did that particular work, to show the excellence of the work, and to establish the man's reputation. A book by Mr. Hunter mentioned trade-marks as an institution of Sheffield. It showed that a jury of cutlers had to assign marks to different manufacturers wherewith to distinguish their respective wares, and the rules governing the granting of the marks were drawn up in a more formal manner during the reign of Elizabeth. It was provided that "no person is to strike any mark upon his wares but that which is assigned to him in the court, under a penalty of 10*s.*" The cutlers of London exercised the power of giving trade-marks, which could not be used or appropriated without a special order of the company; and from the charters of several of our old City companies it was clear that such powers were not only claimed, but pretty generally exercised, with advantage to the companies, to the country generally, and to commerce. The Grocers', the Drapers', the Goldsmiths', the Skinners', and other companies seemed to have inspected articles exhibited for sale, to have punished fraudulent sellers, and, in short, to have acted as general licensers of the trades they presided over. Therefore, merchants' marks and trade-marks were more than mere symbols of ownership: they were certificates and testimonials to character. We must not wonder that special privileges were granted to merchants and traders in those days, for the internal trade of Europe was then carried on at great peril to the merchants, and but for the protection afforded them by the corporate towns

and corporate bodies, commercial enterprise would, it was not too much to say, have remained for centuries in the depth of misery and despondency. In the ninth and tenth centuries there were scarcely any manufacturers in this country, but at length the want of internal trade was met by the establishment of staples and fairs, and so important was the trade done in this way that our statute-book was full of regulations for staples and fairs. It therefore became necessary to protect the dealer, and trade-marks were used almost as a certificate of the merchant's character and the genuineness of his goods. A writer in 1570 showed that these marks were presumptive evidence of property, and in some cases the marks on goods were held to be decisive in questions of ownership or possession. Where the mark was obliterated, on proof being given that it had ever existed, that was sufficient to warrant restitution in case of wrongful detention of goods. The marks were at that time also of use in partnership disputes. Every guild had its own sign or mark, which not only served to distinguish the guild and every member of it, but was also a valuable means of protecting the guilds, their members, and private merchants as well, from illegal societies and unlicensed traders. With regard to legislation on the subject, a statute was passed in the time of Elizabeth for the preservation and establishment of trade-marks, and the last statute affecting the matter was passed last year or the year before; but it was only within the last twenty-five years that a genuine statute had been passed. The 25th & 26th Victoria, chap. 88, gave the modern legal definition of a trade-mark as any name, signature, word, letter, device, emblem, figure, sign, seal, stamp, diagram, or other mark of any description which a person might put on his goods. It gave various remedies for the offences which might be committed by a person against the owner of a trade-mark; it established as property a trade-mark to a person who claimed to have it as his own; and it made an offence under the Act a misdemeanour. The 38th & 39th Victoria, chap. 91, which was passed in 1875, provided that there should be a registration of trade-marks, and that a person should not be entitled to institute any proceeding to prevent the infringement of any trade-mark unless the trade-mark had been registered in pursuance of the Act.

BUILDING PATENTS.*

APPLICATIONS FOR LETTERS PATENT.

769. T. A. Weston, Stamford, U.S.A. Attaching door-knobs to spindles. (Com. by R. H. Lockwood, Stamford, U.S.A.) Feb. 17, 1882.

770. E. Latham, Birkenhead. Bolt fastenings for doors and windows. Feb. 17, 1882.

781. A. Ashwell, West Dulwich. Indicating door-fastenings. Feb. 17, 1882.

786. J. M. Lamb, London. Ventilators and cowls. Feb. 18, 1882.

810. A. S. & C. Buxton and F. O. Ross, Hammersmith. Ventilating valve for preventing bursting of pipes during frost. Feb. 20, 1882.

830. C. Baily, Leeds. Baths. Feb. 21, 1882.

847. W. Meakin, London. Sash pulley. Feb. 21, 1882.

850. J. Everard, Birmingham. Apparatus for raising and lowering blinds. Feb. 20, 1882.

861. H. J. Haddan, Kensington. Closet valves. (Com. by W. Rüdiger, Berlin.) Feb. 22, 1882.

875. J. Slater and R. Pollock, Edinburgh. Shoring or supporting buildings in course of alteration, &c. Feb. 23, 1882.

888. H. Sutcliffe, Halifax. Water-closets, &c. Feb. 23, 1882.

889. J. C. Mewburn, London. Water-closets and water supply therefor. (Com. by J. E. Boyle, Brooklyn, and H. Huber, New York, U.S.A.) Feb. 23, 1882.

893. A. Jamieson, Blantyre. Apparatus for mixing concrete. Feb. 24, 1882.

895. C. Hibbs, Plaistow. Decorative coverings for walls, ceilings, &c. Feb. 24, 1882.

911. J. Parker, Kilmarnock. Manufacture of bricks, tiles, &c. Feb. 25, 1882.

914. S. S. Hellyer, London. Water-closets, urinals, &c. Feb. 25, 1882.

918. H. J. Haddan, Kensington. Ventilators. (Com. by P. Mihan, Massachusetts, U.S.A.) Feb. 25, 1882.

925. W. H. Lascelles, London. Earth closets. Feb. 25, 1882.

934. J. Carpenter, Southampton. Apparatus for opening, closing, &c., window sash-frames. Feb. 25, 1882.

950. W. P. Bonwick, Shepherd's-bush. Window and other fastenings. Feb. 27, 1882.

956. C. D. Abel, London. Ventilating apparatus. (Com. by E. Oehlmann, Berlin.) Feb. 27, 1882.

966. J. T. B. Bennett, Aston. Spring hinges for doors, &c. Feb. 28, 1882.

967. F. Wirth, Frankfort. Stoves for warming rooms, &c. (Com. by E. Schöneberg, Bockenheim, Germany.) Feb. 28, 1882.

975. J. R. Nottingham, Washington, U.S.A. Compositions for manufacture of artificial stone, &c. (Com. by A. Pelletier, Washington, U.S.A.) (Com. Spec.) Feb. 28, 1882.

980. T. Le Poidevin, Guernsey. Machinery for moulding bricks and tiles. Feb. 28, 1882.

999. G. Wilson, New-cross. Fastening scaffold-poles. March 2, 1882.

1,015. W. Brass, jun., London. Reflecting pavement and other lights. March 2, 1882.

ABRIDGMENTS OF SPECIFICATIONS

Published during the Week ending February 25, 1882.

2,857. K. W. A. Leverkus, Manchester. Pumps, ventilators, &c.

Instead of the ordinary ladle of centrifugal pumps or ventilators, one of a varying Archimedean spiral form is used, which causes the water or air to leave the wheel of the pump in a tangential direction. A diffuser is also used, consisting of a canal the area of which is gradually increased. This surrounds the leading casing in one or more turns, and delivers the water at a greater speed. A pear-shaped valve, which is placed in the inlet-pipe, is used to reduce the volume of power. Many modifications are shown in fifty-eight figures in the drawings. June 30, 1881. Price 1s. 4d.

2,969. E. Aldous, Peckham. Apparatus for ventilating buildings.

There are an outer and an inner shaft leading from the top to the bottom of the building. The inner shaft is closed at the bottom, and has a fixed cowl on the top, with four openings, to catch the wind from any quarter. Just above the bottom there are openings into the outer shaft. The wind is thus carried into the outer shaft below all the inlet tubes, and this upcast carries away all the foul air, &c. July 6, 1881. Price 6d.

3,003. G. Furness and J. Robertshaw, Manchester. Taps.

Instead of washers of leather, &c., a plug of lignum vitæ is used. July 8, 1881. Price 6d.

3,020. W. Howitt, Ilford. Sash-bars for horticultural buildings.

A semi-cylindrical sheet of metal is attached to the lower edge of a piece of wood, on the upper edge of which are other pieces of metal, which overlap the lower piece. Each square of glass is inserted edgewise between the piece forming the capping and the lower piece. The overlapping portion is pressed over the edge of the glass, and holds it firmly in position. July 9, 1881. Price 6d.

3,067. J. Gilmore, Norwood, and W. R. Clark, Peckham. Inducing or accelerating an outward draught from chimneys, &c.

A series of rings are mounted one over another on the top of the chimney, which are tapered from the inner periphery outwards. The intervals between the rings are thus circular wide-mouthed apertures, narrowing towards the centre, thereby increasing the velocity of the wind blowing across the mouth of the chimney. July 13, 1881. Price 6d.

3,079. J. Comforth and E. T. Burton, Birmingham. Open firegrates and cooking-ranges for same.

The bottom bars of these grates are tubular, and open into channels at the back, which rise to the height of the front of the grate, where they eject a current of hot air into the smoke and gases rising from the fire, thereby increasing the heat and consuming the smoke. The products of combustion then pass out at the back by a horizontal passage to a vertical flue, which opens into a chamber in which an oven or cooking-range is fixed. July 14, 1881. Price 6d.

3,163. W. Cunnington and W. Cunnington, jun., London. Decoration of paper-hangings, &c.

This uses a mixture of powdered mica, with brocade, bronze powder, powdered gold-leaf, &c., which is, shaken, beaten, or blown on the surface of the paper previously covered with size. July 21, 1881. Price 2d.

3,198. J. W. Cade and F. W. Duffy, Liverpool. Fastener for cords and ropes.

This is specially applicable to the cords of blinds, &c. It consists of a pin and a serrated quadrant, which is pivoted, so that it will hold the cord between its serrated edge and the pin. (*Pro. Pro.*) July 22, 1881. Price 2d.

Published during the week ending March 4, 1882.

2,820. H. Fabian, Erith. Floor-cramp, for cramping floor-boards.

A toothed sliding rack gears into a worm on a shaft borne on the frame. There is an internal ratchet-wheel fixed on the shaft which actuates the worm. The ratchet-wheel is actuated by a lever with pawls, and the sliding rack is pushed forward, jambing the floor-boards together. June 28, 1881. Price 4d.

3,114. W. R. Lake, London. Roofs for houses, &c.

This roofing is constructed of lattice-work, which is coated with cement or hydraulic lime in a semi-liquid state. This afterwards becomes hard, and the roof is made. (Com. by J. Schieder & C. Polzer, Vienna.) July 16, 1881. Price 4d.

3,170. R. R. Gibbs, Liverpool. Apparatus for cooling, cleansing, and purifying air.

A frame is placed in the window, in which are a number of horizontal troughs. Water from a cistern is allowed to flow into the upper trough, whence it overflows into the next lower one, thence to the next, and so on until it reaches the bottom, whence it is conveyed to the sewer. The troughs are at such a distance apart that the water contained in one is a little below the bottom of the next trough above. The air, therefore, entering the room has to pass through the falling water and over the surface of the water in the troughs, and is cooled, cleansed, and purified. July 21, 1881. Price 6d.

3,260. C. D. Abel, London. Gaseliers, &c.

Instead of the usual balance-weights in connexion with sliding gaseliers, a spring drum or barrel is used, on which the chains are wound. (Com. by Messrs. Keyling & Thomas, Berlin.) (*Pro. Pro.*) July 26, 1881. Price 2d.

* Compiled by Hart & Co., patent agents, 28, New Bridge-street. We have been compelled to shorten the list sent: space fails.

NOTES FROM BRISTOL.

THE Bristol Town Council have resolved to sell their Redland tram-line to the Bristol Tramway Company for 8,000*l.*, reserving to themselves the right of re-purchase at the end of twenty-one years. The line is one mile and three-quarters in length, and will as soon as possible be replaced by double lines of steel instead of the old single line of iron rails. There are about thirteen miles of tram-line in Bristol, all worked by one company.

Messrs. Hatherly (Bristol) are rebuilding the extensive premises of Messrs. Jefferies, Canynge House, Redcliff, destroyed by fire several months ago.

At a meeting of the commissioners appointed to consider the question of church extension in Bristol, a very large expenditure was talked of for new places of worship. The recommendation of the commissioners was stated by the Bishop to include the building of six new churches; one in the north of the parish of St. Andrew, which had a population of 8,340 (this district a few years ago was nothing but fields); a new church in St. Barnabas, a parish with a population of 10,232 (this is the new building in Newfoundland-gardens, the foundation-stone of which was laid a few days before); a new church at Lawrence Hill in the parish of Holy Trinity, St. Philip's, where there was a population of 13,450; another church at Barton Hill, with a population of 9,851; a fifth in St. Silas, which had a population of 6,700; and the sixth at Ashton Gate, Bedminster, a parish with a population of 20,847. They also recommended that St. Matthew's, Moorfields, should be enlarged by the addition of a south aisle, and that sites be secured for new churches in St. Mark's, Easton; Windmill Hill, Bedminster; and Downside, Bedminster. The cost of the extension scheme is estimated to be as follows: Sites, 7,000*l.*; three mission-chapels (reckoned exclusive of site at 4*l.* per seat), 3,200*l.*; grant in aid of others, 800*l.*; cost of six new churches and enlargement of a seventh, exclusive of sites, 18,000*l.* (it is believed that the churches could be built in a severely simple style of architecture at 5*l.* per seat); endowment of six ecclesiastical districts, 18,000*l.*; making a total of 47,000*l.* present expenditure, and "an additional annual" expenditure by the clergy of 850*l.*

WYMONDHAM GRAMMAR SCHOOL.

THESE buildings, which have been opened recently, are the result of a scheme drawn up by the local governors, and approved by the Charity Commissioners, for providing a new Grammar School and head-master's house for this foundation, to supersede the old buildings. Competition designs for the buildings, &c., were invited in 1878, and those of Mr. Alfred Smith, architect, Mitcheldean, Gloucester, were accepted, and the works have been executed under the supervision of the architect and Mr. Thos. Stafford, the clerk of works. The new buildings, which are Early English in style, have been erected on a well-elevated site near Wymondham, and contain large schoolroom, class-rooms, dining-hall, day and night rooms, dormitories, sick-rooms, and out-offices, to which are attached large play-grounds and cricket-field. The head-master's house, which adjoins the school, contains drawing and dining rooms, study, assistant-masters' rooms, bath-rooms, bedrooms, and laundry, &c. The external walls are built with Bulwell stone, rock faced and pointed, with white brick quoins and Bath stone dressings. The roofs are covered with Bangor countess slates and red terra-cotta ridge tiles. The interiors of school and class-rooms are constructed with open boarded roofs; a wood dado is provided, being, together with

all internal wood fittings, of pitch pine, varnished. Electric bells have been fitted throughout the buildings. The contractor is Mr. Thos. McCullock, Bulwell, Nottingham. [illegible]

THE "MODEL" BY-LAWS.

REFERRING to the recent discussion on uniformity of building regulations, in which the "model" By-laws were repeatedly mentioned, especially those relating to drains, drain ventilation, and connexion to sewers, it may be of interest to some to learn that the "model" requirements are now in operation in a great number of districts, and that in order to make them more clear and intelligible, some Local Boards have had them illustrated. The Sevenoaks Local Board, for example, with the assistance of Mr. Rogers Field and Mr. Hennell, who have been engaged on the sewerage of the district, have issued a sheet of illustrations of their new building-regulations, which are based upon the Government "model." From this sheet it will be seen that direct communication between the house-drains and the sewers has in every case to be broken, and that at least two openings are to be provided for drain-ventilation, such openings being as near to the lowest and highest parts of the drains respectively as possible. The diagram, which also shows some other useful requirements, indicates how the regulations are applicable under varying circumstances of house-building, and the paper which accompanies the diagram contains in a concise form most of the requirements as to drains, as well as certain desirable suggestions. Other Boards should follow the example.

BOYLE'S SYSTEM OF VENTILATION AT THE LONDON CUSTOM HOUSE.

SIR,—It was with some surprise and no small bewilderment that we read in your issue of last week a letter signed "John P. Seddon," in which that gentleman, without producing the slightest proof beyond his own statement, pronounces the application of our system of ventilation to the Custom House to be not the success it has been represented to be.

As the statement is one affecting our credit, we cannot allow it to pass unchallenged, and in order to show that Mr. Seddon's visit to the Custom House and his remarks thereon were not so entirely disinterested as your readers might suppose, we beg to state that he has consistently shown himself for many years to be strongly antagonistic to our system of ventilation, giving expression to this antagonism on every possible occasion. The reason for this is not far to seek, Mr. Seddon having these six years identified himself with a ventilating cowl known as the Banner Cowl, which he has advocated in the strongest and most laudatory manner in person and through the press, and though this cowl, being a rotatory one, is now practically out of the market, he still maintains, in spite of all that has been shown to the contrary, that it is the most superior cowl in existence, and that all other cowls are worthless compared to it.

Doubtless Mr. Seddon has good reasons for this unflinching partisanship, and it was in this belief that we, finding his name in the list of judges in the ventilation section at the Sanitary Exhibition lately held at South Kensington, formally protested against his acting in that capacity, as, from his expressed opinions, it would be impossible for him to give an impartial judgment. Evidently Mr. Seddon has not forgotten the action we took in that matter.

Your correspondent cannot be a very careful reader of his *Builder* or he would have found therein a full account of the experiments published, as also in over fifty of the leading trade and scientific journals and daily papers of the metropolis, some time before it appeared in *Industry*, which journal he refers to in such a manner as to lead one to suppose that *it* only had taken notice of the experiments. Mr. Seddon does not state why he has postponed his criticisms of our system until this date,—a year and a half after the completion of the work,—but it may perhaps be not irrelevant to mention that our system of ventilation, just applied to the Council Chamber of the Guildhall, with a guarantee from us of complete success, will shortly be put to the specified tests, which are of a most stringent nature; and that the system of ventilation supplanted by ours was the one which Mr. Seddon has so strongly advocated, and in the development of which he has displayed such a deep interest.

When we were called in by her Majesty's Board of Works to ventilate the Custom House we were informed that we would be required to give a guarantee that the ventilation would be satisfactory, and, in accordance with our usual custom, this guarantee was given. The result has already been published in your columns, and we were suitably rewarded by the Board of Works. When the matter was brought up before the Royal Institute of British Architects the most favourable opinions were expressed by those members who had personally examined the system and taken the opinions of the occupants of the Long Room.

With regard to the air-inlets provided, they were the ordinary vertical tubes, and every architect and builder knows that, unless some means are employed for warming the air before entering a building, there is always a liability of a draught being occasionally felt from them; and if Mr. Seddon has derived, or can derive, a method of admitting cold air in winter into a heated building without some of the occupants complaining of a draught, we will at once yield precedence to him as a ventilating engineer, and confess to his having accomplished what has hitherto been to us,—we candidly say it,—an impossibility. All those who participated in the experiments were cognisant of the fact that a draught was occasionally felt from the air-inlets, but they were possessed of a sufficient knowledge of the laws which govern ventilation, especially as regards the air supply, to know that such was, under the existing conditions, unavoidable. The Board of Works did not, at the time our system was applied, deem it advisable,—taking, no doubt, into consideration the very costly and elaborate methods of heating, by which means only the air could be warmed, and the obstruction to business which would be caused during its application,—to specially provide for the warming of the air supply; but we have since then brought out a simple and inexpensive arrangement to effect this, already described in your valuable columns, and which we have submitted to the Chief Commissioner of Works with a view to its application to the Long Room, and should it be adopted, we can confidently assert that there will not be a single flaw to be found in our system, and the only objection which Mr. Seddon can bring against it at present, and one,—from the restrictions under which the work was carried out,—over which we had no control, will then be removed.

Your correspondent goes on to say, "Six ventilators, of apparently 3 ft. diameter, have been placed in the ceiling, from each of which a shaft, 1 ft. 6 in. in diameter only,* subdivided into four parts by crossed partitions, was carried above the roof, and there surrounded by cowl arrangements." . . . . "To be true, the tests should have been applied at the bottom of these or ceiling ends of the shafts. The exhausting power could only have been operating in two of the divisions of each shaft at one time, and, as a fact, it is sometimes operating only in one; and there would be actually down-draughts through the others in cold weather. . . . . So much for the capacity and efficiency of the outlets provided."

Now to show what value is to be attached to Mr. Seddon's "Practical Study on Ventilation," which is the heading to his letter, and the knowledge which he has of our system, and its application:—

Firstly. The air-pump ventilators are not merely *apparently*, but are in *reality*, 3 ft. in diameter.

Secondly. They are not placed *in the ceiling*, but on the ridge of the roof.

Thirdly. The air-pump ventilator is not a beam of wood, but an arrangement to secure an equal extraction of air through a shaft independent of its diameter, the ventilator being a given size, the amount of air extracted depending upon the diameter of the ventilator, and not of the shaft.

Fourthly. There are no cowl arrangements surrounding the shafts carried to the roof, there being nothing but the air-pump ventilators surmounting them.

Fifthly. There are no partitions whatever in the shafts; therefore it is not *a fact* that at times there would only be an up-current in one quarter of the shaft and a down-draught in the other three. Such a thing could not occur in nature.

* "The strength of a beam is its weakest part."

Sixthly. The tests *were* made at the ceiling end of the shafts.

With respect to the alleged down-draught, we beg to give the following extract from a contemporary:—"During the whole of the experiments there was not the slightest down-draught perceptible in the air-pump ventilators, even when all the inlets were closed." We challenge Mr. Seddon to contradict the above, either from his own experience or the experience of others, or to show that there has been any down-draught experienced since the experiments were made. Mr. Seddon casts a very gratuitous and unmerited reflection upon the gentlemen who witnessed the experiments, and whom he rather inconsistently designates "distinguished scientists" when he questions their and our knowledge of the action of the anemometer, giving as a reason for the doubt the very logical one, that "a mistake had been made at the Kew experiments in the reading of the anemometer."

Your correspondent further goes on to say, "the fluctuating average speed, as tested by Mr. Rogers Field, was stated to have been 525 ft. per minute, for six ventilators 3,150 ft. per minute, or 189,000 ft. per hour. Dr. Richardson made it considerably more than twice as much. Which was correct"? Before Mr. Seddon took upon himself to publicly criticise the experiments at the Custom House, in common prudence he should have made sure that he correctly understood the published results. If he had taken this simple but necessary precaution when he assumed the *rôle* of censor, he would have known that the figures given by Mr. Field did not apply to the ventilators at all, but to the velocity of the wind. He further asks a very simple question with respect to Dr. Richardson's figures, taking into account his professed knowledge of ventilation. Is your correspondent not aware that roof ventilators extract more or less air according to the strength of the wind impinging upon them? If this is news to Mr. Seddon we have pleasure in giving him the information he demands.

Mr. Seddon's supposition that wind blowing upon the ventilator would impede the exit of the vitiated air is a display of ignorance of the subject, on which he claims to be an authority, that is, to say the least of it, surprising, as it is the drift of the wind which causes all roof ventilators to act.

He makes another mistake in saying that the figures tabulated during the tests watched by Dr. Richardson were something over 3,150 cubic feet per minute; the actual figures were 8,085 cubic feet per minute, as published in all the reports.

We do not think we can furnish a more conclusive refutation of Mr. Seddon's insinuations than by giving a few extracts from the *Civilian*, the accredited organ of the Civil Service, the writer of the article being, we understand, one of the editors, and employed in the Long Room. He may, therefore, be safely accepted as the mouthpiece of the rest of the occupants. It may also be mentioned that the *Civilian* did not take any notice of the application of the system or the experiments until they had had five months' practical experience of it during the worst part of the year,—from November until March. The following are a few extracts from the article referred to:—

"The clerks in the Long Room of the Custom House are to be congratulated upon having been at last relieved from the intolerable system of ventilation which existed in that important department. It used to be said that in portions of the room the air had not been changed for years, and although this was, of course, an exaggeration, there is no doubt that the atmosphere near the roof was always, at the close of the day, singularly cloudy and impure. It is well known that the clerks have seriously suffered in health in consequence of the abnormal conditions under which they have been compelled to work, and that several premature breakdowns are attributable solely to the detestable atmosphere of the room. At length the intolerable condition of things resulted in the authorities calling in Messrs. Boyle & Son, ventilating engineers, of Glasgow, who have entirely altered the whole scheme of ventilation, and on the completion a series of experiments were instituted to test its efficiency. The advantages of Messrs. Boyle's system have been rendered obvious to the most superficial observer. The atmosphere of the room is now clear and pure, and the old Long Room headache is a thing of the past. The clerks declare that they do not feel the prostration which was formerly the usual result of a day spent in a foul atmosphere, but they leave their work as fresh as when they commmenced in the morning. Messrs. Boyle having rigidly tested their apparatus during five days and in the presence of many scientific and practical witnesses, have convinced the Custom

House authorities that the experiment has been a great success. To show, however, the contrast between the present system and that which it has so ably replaced, the old method of ventilation was put in operation and tested; the down-draughts were, however, so annoying that the ventilators had to be almost immediately closed. No test, however, was needed to convince the officials that the old system was worse than useless, but it was necessary to prove to the distinguished company who watched the experiment that the condition of the room with Messrs. Boyle's apparatus at work and without it differed radically.

But the most curious result of the new system of ventilation has been exhibited in foggy weather. Under the old system a fog often remained for days in the Long Room, when the external atmosphere had become quite clear. On the Monday morning, the last day of the experiment, when a dense fog prevailed without, the atmosphere of the room was found to be perfectly clear, and we are in a position to testify from personal experience to the great benefits derived by the application of Messrs. Boyle & Son's system of ventilation to the Long Room. Messrs. Boyle are to be congratulated upon having successfully grappled with a grave difficulty which had almost become a public scandal."

Upon making inquiry, we find that our system of ventilation at the Long Room is acting as efficiently and satisfactorily as when first applied, the purity of the atmosphere being all that could be desired.

ROBERT BOYLE & SON.

WOODEN BUILDINGS AND THE METROPOLITAN BUILDING ACT.

WILLIAM BURNELL was summoned by Mr. Knightley, the District Surveyor of Hammersmith, with respect to some wooden buildings which he had erected on land near Shepherd's-bush railway station. Mr. Knightley said he was compelled to take the proceedings, as he was afraid of fire. The defendant was a dog doctor and dealer, and what he complained of principally was the "dogs' kitchen," which was wholly composed of wood. The defendant said he used the place for boiling food for the dogs. He had used a similar kind of building in other places for thirty-five years without complaints. Mr. Partridge drove to the place to inspect the buildings, and afterwards adjourned the summons for a month, to enable the defendant to ensure safety from fire.

THE KURRACHEE BREAKWATER.

SIR,—With reference to the allusions to the Manora Breakwater, at Kurrachee (in the article on the "Destruction of Madras Harbour"), in the *Builder* of January 21st, as the engineer who constructed the work in question, on the design of Mr. Parkes (with whom also I am jointly responsible for the setting machinery adopted), and having continued in charge of the work since its completion, with the exception of an interval of furlough, I request the favour of your insertion of the following remarks, especially in reference to the Kurrachee Breakwater.

As I am not concerned with the Madras Harbour works beyond the interest which I naturally take in a work of a professional friend, and which I am persuaded will eventually prove a success, obtained at moderate cost, and will confer great benefit on a large tract of the Indian peninsula, so deficient in harbours, I do not propose to follow your remarks on that work. I may, however, mention, in passing, that the Madras Harbour is very far from having been destroyed, though, undoubtedly, it has suffered from a force of sea which has proved greater than could have been anticipated from any local records available. I may add that at Madras, as at Kurrachee, the force of the local wind has proved no criterion of that of the sea.

I now turn to the Manora Breakwater at Kurrachee, regarding which, in the concluding remarks of my paper read before the Institution of Civil Engineers in the season of 1874-5, I "submitted that the results as to time of execution, stability, and cost have been such as to warrant the construction and means adopted."

Since the above words were written the breakwater has stood, without material damage, the force of seven south-west monsoons, with their constant three-months' hammering of a sea frequently 15 ft. from hollow to crest before breaking.

The cost of the repairs during those seven years, including superintendence, has averaged Rs. 5,531 per annum, i.e. (taking ten rupees to the pound sterling), just one half per cent. on the 109,000*l.* cost of the breakwater.

And this amount has been chiefly expended in gradually adding a layer of concrete on the top to make up for the subsidence by settlement of the outer half length, which was founded on a deep bank of rubble tipped on the sandy bottom.

This has settled considerably,—an average of 4 ft.,—but regularly and without lateral dislocation, which, as mentioned in the paper, only occurred here and there on the shore half-length, where large boulders were met with in the formation.

With the exception of this settlement, which appears now to have nearly reached its limits, the breakwater stands as good as ever.

Judging from experience, I should be disposed to admit that some modifications of details might have been made with advantage; but this is no more than might be said of any large engineering work, and as the Manora breakwater stands, I doubt if any work of the kind can show a better record.

I may here notice an (probably printer's) error in your article, as giving eighteen *acres* instead of *square miles*, as the area at high tide of the Kurrachee Harbour land-locked natural pool.

W. H PRICE, M. Inst. C.E.
Port Engineer, Kurrachee.

Kurrachee.

ROYAL VICTORIA COFFEE HALL.

SIR,—In the very kindly and appreciative notice of the Royal Victoria Coffee Hall which appeared in your issue for February 18th, there is one sentence which may lead to misconception. You say the price of admission is raised on ballad concert nights. This is true only of the better class of seats,—the boxes and reserved stalls,—but admission to the gallery and pit is always (even on occasion of royal visits) 3d. and 6d.

The promoters of the scheme desire, above all things, to make the Victoria a People's Hall. If they can provide entertainments good enough to attract the wealthy, so much the better. Not only is their money a support to a struggling undertaking, and their presence considered by working-people a guarantee that the entertainment is worth going to, but those who are working the Hall would rejoice to think they were furnishing another link between classes whose lives lie usually only too far apart. By all means let there be diamonds in the boxes and shirt-sleeves in the gallery, but the Committee have no desire or intention to let the inhabitants of the New Cut be pushed aside for the sake of their richer neighbours.

A contrary report is likely to do the Victoria harm with the public, and by inserting this explanation you will therefore greatly oblige

ONE OF THE COMMITTEE.

SKILLED WORKMEN.

SIR,—Under this head much may be said and written; but, if we are to get instruction, we certainly must seek for some better explanation of the existing state of things than that which has been offered us.

I am of those who believe in the English workman of to-day being equal to his predecessors; that his condition, surroundings, and opportunities, have altered, but that he is what these have made him.

Society, or the public at large, is compelled to progress or change with the altered character of its time; numbers are every year added unto those who are required to earn their daily bread. Of these a considerable few aspire to be first workmen or master workmen, or architects. They enter, as a rule, by what is called the royal road, an office where they learn to draw pictures, abstract, and "bill," much in the same way as a parrot is taught to speak; they are set a copy and, having repeated it, are sent into the world to maintain themselves and instruct the public. Can we wonder that the public are not better educated if such fledglings are their only or chief instructors? And what man of experience will not bear me out when I say, of all the bitter reflections thrust upon him, not one can equal that of not knowing where to find an appreciative or sufficiently educated audience to allow of his work being appraised at its real value?

Not so did the ancient artists, architects, or chief workmen live. The early church was the life of art, and under her protection the master worked with his pupils. Now, very few indeed are the masters who instruct in person their young men, and very few are the patrons who can appreciate good artistic workmanship,—workmanship which, in its details and in the putting together, goes to make the whole.

Supply will generally be found equal to demand, in labour as in everything else; they have a tendency towards each other. When architects require good work done, men can be found to do it, and who are always willing to be instructed. That man who says men are not disposed to learn does not yet know much about human nature, or he would know that in skilled labour to excel is the ambition of every honest man, and I have yet to learn that mechanics are worse in this respect than their fellows of any and every other social grade or position.

Employers of labour do well to know their men, but they do far better, if unable to direct them themselves, to appoint over them a man who is really what he professes to be—a competent foreman; but his chief qualification is generally found to be that he is what the men style a nigger-driver or bully. I have always found that firmness, punctuality, and a genuine respect and discrimination will produce as its results good work and quantity. For men who have families to maintain have a very good incentive; they do not care to have their household gods disturbed at all, certainly not oftener than necessary, and thus they combine for protection, for they have learned that "union is strength" by experience. The modern commercial builder, who to be successful must be a capitalist and good arithmetician, calculates his estimates and profits to be obtained therefrom only by knowing the exact cost of the required labour in their execution: thus he endeavours to obtain the greatest possible return from his workmen by getting as much as he can, and by every possible means, from them, and to reduce their labour he very properly employs the best machinery for doing that which formerly went far to make, and now in a great measure prevents the man becoming, a skilled workman early in life; for unless he has acquired by practice a complete mastery over his tools he can never become a skilled mechanic. With the best machinery which can be devised, and an efficient staff for its application, work of a superior character is now being turned out in far larger quantity, and at a much reduced rate, than formerly. This I am prepared to prove if necessary.

Another conclusion I will also challenge contradiction in, and that is, there are more good workmen to be found to-day than existed twenty-five years ago. "Oh," but some one says, "are there not a very great many now who do not know how to do anything well?" Yes; as before stated, supply is equal to the demand in labour, if not always found so in material. Monopolists, in their haste to be rich, make all men suffer in turn. Land is too heavily priced and transferred; the house which should cost 1,000*l.*, if properly built, must be undertaken at 500*l.* Who will undertake it? In the first place, some lawyer is always to be found who will find a market for somebody else's money; he therefore in turn finds a jerry builder, who in turn again finds the ignorant, unskilled, and uneducated, and therefore least responsible workman to put up these (what shall we call them?) fever-breeding heaps of rubbish, which only require the atmosphere to disseminate their poisonous contents, and to exhibit their ruinous construction; but one of the parties to their production has been overlooked. Let us do justice as far as practicable. Plans and elevations must be prepared and submitted before the law has been complied with in the erection of such dwellings. Who has produced the pretty picture? The modern architect before described. There are many professing architects who are unable to compete with a great many of the workmen of to-day in the preparation of detail plans, thanks to the many efficient schools for drawing which now exist. Somebody says, "Drawing is not everything required to make a good workman." Who thinks it is? Not the workmen certainly; but I guess the readers of this paper know some professed architects who hold this opinion of their own capabilities. But are there not any good architects left? Oh, yes, there are many who know how to build without giving offence to the eye of a properly-educated critic, and know also whether the material used is

what has been specified; but these are not always the most successful. The British public prefer something new, or professedly so. They are æsthetic to-day. Are they? Are the many oddities jumbled together in a haphazard sort of way such as we now often see, art or the result of it? I do not think so.

In conclusion, let me say a word on unionism. It is not responsible for bad workmen, but is, in its own best interest, compelled to exercise the rule quoted by "Joiner"; for if men are unequal "and they are in skill as in all else," the most efficient is the most skilled, and therefore keeps his employment longest, and that man who cannot maintain or obtain employment through incompetence is a drag upon the funds of his society, and therefore not one to be admitted.

Skilled workmen are deserving to be held in the greatest esteem, for men who can use with precision many tools in the art of building or in manufactures, and can practically apply their knowledge of Euclid in their every-day occupations, will eventually receive more credit, for they are superior to some of those men who now sit behind a desk, knowing how to use but one,—a pen,—and that in the copying of instructions or quantities, supplied by another.

JOHN GEO. CAREY.

BUILDING BY-LAWS: MORTAR.

A CASE of considerable interest was last week decided by the Hove (Brighton) magistrates. A speculating builder, named Edmund Turner, was summoned by Mr. Ellice-Clark, the Surveyor to the Local Authority, for not "properly bonding and solidly putting together with mortar" the external and party walls of three houses in Sackville-road, Hove. From the evidence of Mr. Ellice-Clark it appeared that he surveyed the walls in question on December 22nd, and served the defendant with a notice to take down the walls on the following day. To this notice no attention was paid; and on the 11th of January specimens of the mortar were removed from the walls for analysis. Mr. Ellice-Clark said the material used between the bricks was not mortar in the sense that mortar is a material composed of lime and sand, or cement and sand, in such proportions as would attain an inherent hardness, and adhere to bricks or stone, having such cohesive properties as would hold them together so as to resist pressure or shocks. Good mortar would attain such a degree of induration as that frost, rain, and sunshine would not reduce the permanent hardness. The material used by the defendant was composed of coarse gravel, loam, and a little lime, and was not a mortar which would solidly put together a wall.

Two other surveyors gave confirmatory evidence.

For the defence, it was urged that the mortar, though not of a high class, was still such mortar as complied with the By-laws, and evidence was given by six or seven builders to show that the mortar was good, several giving their opinion that it contained one of lime to four or five of sand and gravel, which they considered was good mortar. Amongst the witnesses for the defence were two members of the prosecuting Local Authority, both of whom were also members of the committee who initiated the proceedings. Mr. Simpson, an architect of many years' practice in Brighton, was also called, and gave his opinion that the mortar was good, and sufficient for the class of property, although, subsequently to the notice of the Town Surveyor, one of the walls had fallen down. This, the witness considered, was due to the rapidity with which the work was pressed forward, and not to the bad quality of the mortar.

The evidence thus being of a conflicting nature,—on the one hand, Mr. Ellice-Clark, the Town Surveyor, giving his opinion that there was but 1 part of lime to 17 or 18 of gravel, sand, and loam, and the defendant's witnesses putting the proportions at 1 to 4 or 5,—it was decided to have the mortar analysed by Mr. Jago, F.C.S.

The result of the analysis was as follows:—

—	COARSE MORTAR.*						FINE MORTAR.*		
Gravel	69·99	69·31	68·21	61·72	67·48	54·25	8·34	10·71	30·68
Sand	12·38	10·49	13·75	17·02	13·84	22·53	59·30	58·80	47·07
Carbonate of lime (chalk)	6·31	5·59	8·12	9·03	9·39	10·48	10·73	17·52	10·67
Quicklime	3·77	4·47	1·93	3·08	0·74	2·96	7·50	1·82	2·56
Combined water and loss	1·21	1·33	0·62	0·99	0·24	0·95	2·40	0·59	0·82
Clay	6·34	9·11	7·37	7·26	8·31	8·83	11·73	10·55	8·20
The amount of gravel and sand to 1 of lime by measure	8·81	7·7	16·9	10·2	43·41	10·4	3·06	12·2	

* In 100 parts by weight.

The gravel and sand being taken at 110 lb. to the cubic foot.
The lime " 44 lb. " "

By these figures it was seen that the amount of lime, as compared with the gravel and sand, was in all but one case very disproportioned, and if the other aggregates had been added to the gravel and sand, the case of the town authorities was still stronger and their surveyor's evidence substantiated, while that of the defendant's witnesses fell to the ground. Under these circumstances, the Bench were unanimous in inflicting on the defendant a fine of 5*l.* for using material which was not mortar, and 40*s.* for proceeding with the erection of the buildings when directed not to do so by the Town Surveyor. The Bench expressed their regret that it was out of their power to order the demolition of the buildings, the power of doing this resting with the local authorities.

Reflecting on the case, three prominent features of general interest are brought to light. The weakness of by-laws in not specifying the ingredients of mortar; the appearance of two members of the prosecuting committee in favour of a defendant whose case was so glaringly bad; and the demolition or retention of the condemned houses resting with the local authority, whose members gave evidence against their own officials. Up to the present time the authorities have not yet ordered the demolition of the houses.

SCHOOL-BOARD SCHOOLS.

Bradford.—At a meeting of the Bradford School Board on the 22nd of February, a letter was read from the Education Department, approving the plans for Wapping-road School, with accommodation for 384 older children and 238 infants, and sanctioning the borrowing of 3,608*l.* for the purpose of putting the plans into effect. Approval was also given to the plans for Barkerend and Carlton-place schools, the accommodation in the latter place being for 407 boys, 414 girls, 352 higher girls, and 328 infants. The Department requested that tenders should be forwarded for consideration. It was resolved to affix the seal of the Board to the contracts for the purchase of the Carlton-street School site, and to accept the elevation plan for the school, subject to the approval of the Education Department. Mr. Milligan remarked that he had a letter from the architects of the school, which gave an estimate of the cost of buildings, playgrounds, &c., at 14,000*l.* The site had cost 5,000*l.*, and the total sum required for building and furnishing the school was estimated at about 20,000*l.* As nearly as possible accommodation for 1,500 children would be provided, and the outlay per child was, therefore, put down at 9*l.* 11*s.* 4*d.*

Finstall.—The new schools at Finstall, erected for the Stoke Prior United District School Board, have been opened. The schools, including benches, desks, and fittings, have, it is stated, been erected for somewhat less than 6*l.* per child. The new schools are situated at Aston Fields, near the railway station, Bromsgrove. About a year ago the School Board invited architects to send in plans in competition for the proposed building, and about eight sets of plans were submitted to the Board by various architects. The design bearing the motto, "Convenience and Economy," submitted by Mr. John Cotton, of Birmingham and Bromsgrove, was selected, and the tender of Messrs. Tilt & Fisher, of Bromsgrove, amounting to 1,290*l.*, was accepted. The premises accommodate 220 children, and comprise a mixed schoolroom (boys and girls), 57 ft. long by 20 ft. wide, with a class-room 20 ft. square; infants' room, 32 ft. long by 20 ft. wide; book store, &c., and separate lobbies, lavatories, out-offices, and large gravelled playgrounds for each sex. The school-rooms are well lighted and airy, the roof being open to the collar-beams, and are warmed by strong Leamington bar grates, set with fire-brick backings and sides. The class-rooms and infants' school are supplied with the "Reliance" patent desk, supplied, with other school appointments, by the Midland Educational Company, Birmingham. In addition to pivot-hung casement windows there are special inlets or ducts for fresh air by means of gratings under the window-sills, connected with slides in the window-boards, which are capable of being opened or closed at will. There are also means for the escape of heated or vitiated air through panels in the ceilings. The building, which is Gothic in style, is of red brick, with stone dressings where necessary, and has bold chimneys, and a steep-pitched roof covered with Staffordshire tiles and red ridge cresting. There is a bell-cot of open-timber work set on the roof. The site is enclosed from the road by a low brick wall, with hard stone coping, brick pillars with ornamental stone caps, double doors in the centre, and wrought-iron railing (made by Mr. Hedges, Bromsgrove, from special details) extending to the sides. The playgrounds are enclosed with substantially-built walls.

Miscellanea.

Electric Light Engineering.—At the last meeting of the Society of Engineers, held in the Society's Hall, Victoria-street, Westminster, Mr. Jabez Church, President, in the chair, a paper was read entitled "Notes on Electric Light Engineering," by Mr. C. H. W. Biggs and Mr. W. Worby Beaumont. The few fatal accidents which have attended the employment of powerful electric currents for lighting purposes were first touched upon, and it was shown that these were entirely due to insufficient care in insulation, and need never recur. The calculation of resistances was next touched upon, especially with relation to the best arrangement of circuits and internal and external resistances of dynamo-machines, so as to secure the most economical results. The substitution of iron for conductors of large size in place of copper was next touched upon, in view of the possible rise in the cost of copper when many miles of conductors of large size are required for large installations, iron being shown to be cheaper, though the weight required would be about as 2·7 to 1. The different sources of motive-power were considered, steam engines being preferred as more economical, more uniform in velocity of rotation, more reliable, and as being capable of more precise regulation than gas engines as at present employed. Secondary batteries as accumulators and regulators were also referred to as having an important place in electric lighting and power-transmitting plant, and descriptions were given of some forms of these, as now before the public, which were published nearly twenty years ago. The cost of electric lighting on a large scale was given as about two-thirds that of gas.

Portraits of Villains.—We have received from the London Stereoscopic and Photographic Company a portrait of the wretch, Roderick McLean, who attempted to assassinate her Majesty on the 2nd inst. Doubtless some of our readers will be glad to know that they can add it to their collection of such portraits. We cannot blame the Company for hastening to supply a demand of the kind if it exist, but, for our own part, we deeply regret that such scoundrel-scum should be foisted into additional notoriety, suggesting to other ill-conditioned and evil-minded persons anxious to become notorious how easily such an end may be attained. As to the present reptile, McLean, our regret is that he was not brained on the spot and pitched into the nearest cesspool.

Marlborough Rooms, Regent-street.—On Tuesday afternoon, the 28th inst., Miss Rosa Kenney, who made a very successful *début* at Drury Lane some time ago, and has since been gaining experience in the country, will give a recital, which will include Alfred Tennyson's new poem, "The Charge of the Heavy Brigade at Balaclava," and a selection from "The Passing of Arthur." Miss Edith Wynne and some other distinguished artists will help her.

Smoke Abatement.—The Lord Mayor, the Right Hon. John Whittaker Ellis, entertained at the Mansion House, on the 11th inst., about seventy gentlemen connected with art, science, and literature, and more or less connected with the recent Exhibition of Smoke Abatement Appliances at South Kensington. Some good speeches were delivered by Mr. Shaw-Lefevre, M.P., the President of the Royal Academy, Mr. E. Hart, Mr. G. A. Sala, and others; the Lord Mayor himself playing his own part admirably.

Tramways for Steep Gradients.—At a recent meeting of the Metropolitan Board of Works a deputation waited upon the Board from the promoters of the Highgate-hill and Pentonville-hill Tramway schemes, to present a memorial in support of the proposal to construct tramways along Highgate-hill and Pentonville-hill. The memorial stated that provisional orders were being applied for by the Steep Grade Tramways and Works Company, for authority to lay tramways on the above-mentioned hills. The Vestry of Clerkenwell, who were the road authority for Pentonville-hill, and the Vestry of Islington, who were the road authority for so much of Highgate-hill as was under the jurisdiction of the Metropolitan Board of Works, had consented to the tramways being constructed. The promoters contemplated working the tramways by a process which they claimed to be peculiarly adapted to steep gradients, which had been successfully in use for nine years in San Francisco, and in other places abroad. The method of traction consisted of a wire rope placed in a tube beneath the level of the roadway, the top of which tube was provided with a narrow slit open to and level with the roadway, and running parallel with and midway between the tramway-rails. The purpose of this slit, which was less than an inch in width, was to allow of the projection through and movement along it of a hook or other fastening to connect the wire rope with the tram-car. The rope was worked by stationary engine-power, the engine works being also underground or placed in some building level with the houses, by the roadside and hidden from view, any point along the whole route being equally convenient as the position of the engine-power. The Board has since resolved not to oppose the granting of the provisional orders sought.

Messrs. Crosby Lockwood & Co. announce the immediate publication of the following works:—1. "Continuous Railway Brakes." By Michael Reynolds, author of "Locomotive Engine-Driving." This book will treat of the construction and working of the various systems of railway brakes now in use, and is intended for the general as well as the professional reader, and should prove of considerable interest, as the question of continuous brakes is now attracting the attention of the Government. 2. "The Action of Lightning, and the Means of Defending Life and Property from its Effects." By Arthur Parnell, Major in the Corps of Royal Engineers. 3. "The Boiler-maker's Ready Reckoner." By John Courtney. Edited by D. Kinnear Clark, M.Inst.C.E. 4. "A Practical Treatise on the Joints made and used by Builders in the Construction of various kinds of Engineering and Architectural Works, &c." By J. W. Christy.

The London Fever Hospital, Liverpool-road.—We are sorry to hear that two wards must be closed, owing to the want of funds. This is the only hospital in London devoted to the reception of persons suffering from infectious fevers, who are not paupers. It is very largely used by *employés* in shops, domestic servants, and schools; but there are also private rooms for persons of a superior class. The hospital has no endowment, and last year it exceeded its income by 4,000*l*. Its available capital is now reduced to less than 5,000*l*. If it does not receive largely-increased support, it must be closed next year. Will some of our readers help it?

Memorial of the British Army under Wellington, 1813-14.—Mr. E. J. Physick, sculptor, has been commissioned to execute the various sculptured marble tablets to be placed in the beautiful memorial porch now being added, from the design of Mr. Mileham, architect, to the Church of St. Andrew, Biarritz. These memorials will contain the name of every officer in the British Army and German Legion who fell in the campaign between Oct. 7th, 1813, and April 14th, 1814, together with the place and date of death of each. They also will record the British loss of non-commissioned officers and men, under the heading of the various regiments engaged, with the date of each engagement.

St. Pancras Workhouse Competition.—We have received a long letter for publication from Mr. Bridgman, one of the competitors, and who has acted for the last eight years as architect to the Board, complaining of the course pursued by them, and especially that a professional man was not called in to assist them in adjudicating upon the plans, but we are unable to find space for it.

The New Town Hall at Bermondsey was formally opened on Wednesday last. The building, which occupies a site in Spa-road, adjoining the baths and washhouses, was described and illustrated by a double-page view and plans in vol. xxxix. of the *Builder* (Nov. 13, 1880, pp. 588, 591). The architects are Messrs. Geo. Elkington & Son, and the builders were Messrs. Perry & Co., of Tredegar Works, Bow, whose tender, amounting to 21,200*l*., was accepted from amongst nineteen others. Dennett's concrete arching and Jackson's fibrous plaster have been largely used for floors and ceilings. Mr. Hammer has supplied the pitch-pine benches for the gallery. The hot-water apparatus is by Messrs. J. L. Bacon & Co. Messrs. Strode have supplied the gaseliers of the large hall and board-room, and the lifts are by Messrs. R. Waygood & Co. The furniture has been supplied by Messrs. John Finch & Co., and Messrs. Goode, Gainsford, & Co. The large hall, including the galleries, will hold about 1,400 persons.

Presentation.—An interesting presentation was made on Tuesday last at the Holloway College, Virginia Water, to Mr. J. W. Thompson, the contractor for the works, by his *employés*. It took the form of a bronze statue of himself, standing on a massive bronze pedestal, in which was a box containing an address. The modelling was by Signor Fucigna, and the work was carried out by Mr. J. W. Benson, of Ludgate-hill.

Impeachment. — A Bedfordshire reader wonders to what extent architects are victimised by their plans being "cabbaged" by borough surveyors and their relations, who make use of a good opportunity to do "a little on their own account." We attach no importance to general charges of this kind. If our correspondent were to point to special cases they could be inquired into.

Kensington Artists.—A *conversazione* is to be held in the Town Hall, Kensington, on Friday, the 24th inst., to the entertainment at which some seventy artists connected with the neighbourhood, many of them our leading painters, will contribute. Mr. S. Bird, of Sussex-place, is the hon. secretary.

Builders' Clerks' Benevolent Institution.—The fourth annual dinner of this useful institution is announced to take place on Monday, the 27th inst., at the Guildhall Tavern, Mr. Arthur C. Lucas, president, in the chair.

The Third Annual Building Exhibition in the Agricultural Hall, Islington, opens on Monday next, and will remain open a fortnight. We hear that in variety and extent it will surpass last year's display.

Society of Lady Artists.—The annual exhibition is now open at 48, Great Marlborough-street. We must find another opportunity to say a word or two about it.

TENDERS

For alterations to premises, Worship-street, for Messrs. Cohen & Son. Messrs. Hammack & Lambert, architects:—

Brass	£5,243 0 0
Kilby	5,148 0 0
G. Williams & Son	5,100 0 0
Merritt & Ashby	5,055 0 0
G. S. Pritchard	4,998 0 0
J. H. Johnson	4,993 0 0
E. Lawrence	4,981 0 0
Ashby Bros.	4,910 0 0
Bangs & Co.	4,899 0 0
Boyce	4,770 0 0

For the erection of a warehouse, Fann-street, for Mr. R. Stapleton. Messrs. Hammack & Lambert, architects:—

J. H. Johnson (accepted)	£1,035 0 0

For the restoration of St. Michael's Church, Owermoigne, Dorset. Mr. S. Jackson, architect:—

J. Beer, Wareham (accepted)	£756 0 0

For the erection of three cottages, for Adam Jones's Charity, Owermoigne, Dorset. Mr. S. Jackson, architect:—

J. T. Wheltam, Weymouth (accepted)	£390 0 0

For the erection of a villa residence, on the Bush Hill Park Estate, Enfield, for Mr. F. W. Harris. Mr. R. Adolphus Cane, architect:—

H. Baylis (accepted)	£870 0 0

Accepted by the Hornsey Local Board for the following annual contracts, from March, 1882, to March, 1883, as per schedule:—

Road Materials.

E. Head, City Wharf, New North-road, Hoxton, N.

Sewer Jobbing Work.

T. G. Dunmore, Crouch-end, N.

General Cartage.

W. T. Williamson, Pottery Works, Green-lanes, N.

Dusting.

Hodson & Co., West Green-road, Tottenham, N.

Street Watering.

F. A. Jackson, Woodstock-terrace, Finsbury Park, N.

Mason and Paviar's Work.

P. Aspinall & Son, Crown Wharf, New North-road, N.

For erecting new banking premises, for Messrs. Brown, Janson, & Co., Abchurch-lane. Mr. John Whichcord, architect:—

Higgs, Hill, & Higgs	£9,140 0 0
Trollope & Sons	8,964 0 0
Mark Manley	8,797 0 0
Bywaters & Co.	8,675 0 0
Macey & Sons	8,556 0 0
Scrivener & Co.	8,459 0 0
Ashby & Horner	8,440 0 0
Bangs & Co.	8,400 0 0
E. Lawrence	8,364 0 0
Perry & Co.	8,150 0 0
David King & Sons	7,945 0 0

For additions to the Holborn Town-hall, Gray's-inn-road. Messrs. Isaacs & Florence, architects. Quantities by Mr. L. C. Riddett:—

Conder	£1,441 0 0
Wall Bros.	1,394 0 0
Patman & Fotheringham	1,392 0 0
Woodward	1,349 0 0
Killby	1,283 0 0
Macey & Sons	1,256 0 0
W. Scrivener & Co.	1,219 0 0
Stimpson & Co. (accepted)	1,121 0 0

For pulling down and rebuilding the Dolphin Inn and fish-shop adjoining, in the High-street, Winchester. Mr. T. Stopher, architect:—

Stearman, Winchester	£2,350 0 0
Fielder & Son, Winchester	2,330 0 0
Sealey, Winchester	2,297 0 0
R. Carter & Son, Winchester	2,276 0 0
Crook, Southampton	2,227 0 0
Marsh, Winchester	2,193 0 0

For the execution of certain sewerage works at Streatham, for the Metropolitan Board of Works. Sir Joseph Bazalgette, engineer:—

Nowell & Robson	£7,675 0 0
Williams, Son, & Wallington	7,500 0 0
Kellett & Bentley	7,207 0 0
Mowlem & Co.	6,668 0 0
Cave	6,300 0 0
Turner & Son	5,996 0 0
Crockett	5,789 0 0
Boterill	5,695 0 0
Cooke & Co.	5,400 0 0
Bottoms Bros.	5,359 0 0
Dickinson	5,240 0 0
Rigby	4,900 0 0
Mackenzie, Williams, & Co.	4,780 0 0
Rolls (accepted)	3,423 0 0

For erection of baths at Skegness, Lincolnshire. Mr. James Whitton, Lincoln, architect:—

General Contract.

Drury, Hull	£2,734 0 0
Crawshaw, Skegness	2,515 0 0
Kendall, Market Rasen	2,450 0 0
Riggall & Hewins, Grimsby	2,389 0 0
Kidd, Alford	2,198 0 0
Horton & Harrison, Lincoln	2,153 0 0
Dunkley, George, Skegness (accept.)	2,150 0 0
Crosby & Sons, Lincoln	2,090 0 0

Iron Roof to Swimming Baths.

Sayers, Bradford	£459 0 0
Morton & Co., Liverpool	657 0 0
Mitford & Co., London	628 0 0
Rubery, Liverpool	625 0 0
Bulmer, Old Bolingbroke	610 0 0
Young & Akrigg, Hull	590 0 0
King & Co., Hull	589 0 0
Stephenson & Sons, Boston	569 16 0
Bretteil, Worcester	542 0 0
Hill & Smith, Brierley Hill	540 0 0
Porter & Co., Lincoln	498 0 0

Note.—None were accepted, it being decided to have a timber and slated roof, to cost about £350.

For the building of residence for J. M. Norman, at Layham, Suffolk. Mr. F. E. Morris, architect:—

J. Welham, Layham	£2,426 13 0
E. Saunders, Dedham	1,834 0 0
G. Lee, Colchester	1,740 0 0
C. H. Oldridge, Colchester	1,724 0 0

For the erection of pair of semi-detached villas for Mr. R. Chitham, Colchester. Mr. J. F. Goody, architect:—

G. Dobson, Colchester	£1,025 0 0
F. Eade, Colchester	1,020 0 0
A. Diss, Colchester	999 10 0
Everett & Son, Colchester	999 0 0
C. H. Oldridge, Colchester	947 0 0
F. Dupont, Colchester	925 0 0
A. Chambers, Colchester	899 19 6

For the erection of a new brewery at Northampton, for Messrs. Ratcliffe & Jeffery. Messrs. Davison, Inskipp, & Mackenzie, engineers and architects. Quantities (for No. 1 contract) by Messrs. Curtis & Sons:—

Contract No. 1—Building.

H. Martin, Northampton	£5,840 0 0
Smith Bros., Northampton	5,585 0 0
T. Cosford, Northampton	5,560 0 0
G. Heap, Northampton	5,540 0 0
Dunkley, Blisworth	5,090 0 0
J. Watkins, Northampton	5,089 0 0
Branton & Son (accepted)	4,975 0 0

Contract No. 2—Copper.

	No. 1.	No. 2.
Siddeley	£650 0 0	£760 0 0
Blundell Bros.	635 0 0	739 0 0
Bindley & Briggs	600 0 0	670 0 0
Henry Pontifex & Sons	540 0 0	685 0 0
Shears & Sons (accptd.)	504 0 0	639 0 0

Contract No. 3—Backwakers' Work.

Bennett	£450 0 0
Church	410 14 0
Oxley (accepted)	384 0 0

Contract No. 4—Millwrights' Work.

Bennett	£1,057 0 0
Thornewill & Warham	980 0 0
Oxley (accepted)	928 0 0

Contract No. 5—Pipe Connexions.

Blundell Bros.	£1,112 0 0
Pontifex & Sons	958 0 0
Bennett	945 0 0
Oxley	918 0 0
Bindley & Briggs (accepted)	900 0 0

For proposed Mission-room, St. John's, Blackheath, S.E. Messrs. Drury & Lovejoy, architects. Quantities supplied by Messrs. Strudwick & Mennie :—

Heryett	£1,805 10 0
Pound	1,751 0 0
Gorrum	1,685 0 0
Tongue	1,649 0 0
Kirk & Randall	1,637 0 0
Bush	1,533 0 0
Jerrard	1,492 0 0
Smith & Son	1,459 0 0

For the erection of an hotel and stables at West Wickham, Kent. Mr. A. R. Stenning, architect. Quantities by Messrs. Fowler & Hugman :—

Nightingale	£3 383 0 0
Macey & Son	3,310 0 0
Borrows	3,300 0 0
Cox	3,277 0 0
Jerrard	3,273 0 0
Graham	3,230 0 0
Outhwaite & Son	3,129 0 0
Sabey & Son	2,948 0 0
W. Downs	2,784 0 0

For repairs to the Embankment-wall, Grosvenor-road, for the New Westminster Brewery Company. Mr. H. W. Budd, surveyor :—

King & Son	£250 0 0
Mowlem	2?6 0 0
Shaw	196 0 0
Hoare & Son	182 0 0

For the erection of business premises, 72, St. Mary-street, Cardiff, for Mr. S. Hern. Mr. W. D. Blessley, architect :—

Job Thomas	2,548 0 0
E. Howard	2,460 0 0
W. Thain	2,448 0 0
Charles Bird	2,310 0 0
David Thomas	2,200 0 0
Parnell & Fry	2,126 0 0
D. J. Davies	2 100 0 0
Samuel Shepton	2,095 0 0
Edwin Jeffries	1,975 0 0
F. S. Lock	1,974 0 0

For alterations to 59, Crockherb Town, Cardiff, for Dr. Williams. Mr. W. D Blessley, architect :—

Samuel Shepton	£322 5 0
E. Howard	22? 0 0
E. Trotman	220 0 0
Parnell & Fry	215 0 0
Charles Bird	190 0 0
Wm. Thain	179 0 0
D. Thomas	150 0 0

For pulling down and rebuilding house and shop, 343, Commercial-road, for Rev. C. Bromehead. Messrs. J. & J. Belcher, architects :—

Hill	£831 0 0
Friggins	713 0 0
Moyll & Son	648 0 0
Veal	598 0 0

For rebuilding workshops in Ship-street-gardens, Brighton, for Mr. James Holsner. Quantities supplied by the architect, Mr. Henry Branch :—

Ide & Son	£1,029 13 0
Howard	960 0 0
Wright (accepted)	916 0 0

For forming roads and constructing sewers, &c., on the Chitts Hill Estate, Wood Green, for the Artisan's Freehold Land Company. Mr. Cronk, surveyor :—

Keeble	£2,700 0 0
Killingback	2,587 0 0
Nicholls, Wood-green	1,795 0 0
Adams	1,750 0 0

For the Princess Alice Memorial Hospital, Eastbourne. Mr. Thomas W. Cutler, architect. Quantities by Messrs. Quilter & Hardcastle :—

Cornwell, Eastbourne	£6,659 0 0
Dore	6,511 0 0
Wheeler, London	6,400 0 0
Peerless, Eastbourne	5,530 0 0
Bentley, Waltham Abbey	5,327 0 0
Perry & Co., London	5,260 0 0
Nightingale, London	5 110 0 0
Jones & Co., Gloucester	4,790 0 0
Crook, Southampton	4,719 0 0
Kingerlee, Banbury	4,560 0 0
Longley, Sussex	4,394 0 0
Gregor, London	4,357 0 0

For additions to the Clarence Esplanade Pier, Southsea, for the Clarence Esplanade Pier Company, Limited. Messrs. Davis & Emanuel, architects and engineers. Quantities supplied by Mr. H. P. Foster :—

For Enlargement of Pier Platform,

W. Hill & Co. (accepted)	£1,575 0 0

For Substructure of New Pavilion and Approach.

W. Hill & Co. (accepted)	£770 0 0

For Superstructure of New Pavilion and Approach.

W. Hill & Co. (accepted)	£5,893 0 0

For New Tramway Depot at Gosport, Hants, for the Provincial Tramways Company, Limited. Messrs. Davis & Emanuel, architect's. Quantities supplied by Mr. H. P. Foster :—

G. Burbidge	£3,347 0 0
T. C. Cooper	3,300 0 0
W. Ward	3,292 0 0
H. & W. Evans	3,100 0 0
W. R. & C. Light	3,000 0 0
W. Hill & Co. (accepted)	2,950 0 0

For additions to North End Tramway Depot, Portsmouth, for the Provincial Tramways Company, Limited. Messrs. Davis & Emanuel, architects. Quantities supplied by Mr. H. P. Foster :—

T. C. Cooper	£800 0 0
W. Ward	797 0 0
H. & W. Evans	765 0 0
W. R. & C. Light	727 0 0
George Beech	650 0 0
George Burbidge (accepted)	650 0 0

For the erection of dwelling-houses, Stoke Newington-common, for the Incorporated Society of Licensed Victuallers. Mr. H. I. Newton, architect. Quantities supplied :—

Chamberlain Bros	£12,954 0 0
Walker	12,320 0 0
Steel Bros.	12,319 0 0
Grimwood & Sons	12,300 0 0
Word	12,250 0 0
Royal	11,984 0 0
Smith	11,866 0 0
Gentry	11,800 0 0
Lamble	11,735 0 0
Pickersgill Bros.	11,354 0 0

TO CORRESPONDENTS.

W. H. W. (shall have attention).—East Anglian (we cannot look back).—R. A. C.—H. & L.—J. L. W.—T. H. L.—E. J. T.—A. B. P.—M. P.—P. G. S.—B. F.—H. B.—D. K. & Bro.—S. W. & Co.—J. M. & Son.—R. B. M.—D. T.—H. P. F.—T. W. C.—J. W. B.—W. M.—J. R.—G. M. D.—J. D. W.—E. P.—J. P. R.—M. & Co.—J. J.—E. J. P.—B. R.—*. J.—J. D.—E. T.—G. E. & Son.—S. J. J.—T. B.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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